UNIT-SPECIFIC TECHNICAL MEMORANDA

VOLUME VI

SUMMARY
SITE INVESTIGATION AND REMEDIATION REPORT
AIRPORT/KLONDIKE AREA
AT
PRATT & WHITNEY
EAST HARTFORD, CONNECTICUT
EPA ID No. CTD990672081

Prepared for:

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LEA Comm. No. 68V8124

DRAFT

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3. INVESTIGATION METHODOLOGIES

The investigative methods and procedures followed to characterize the site environmental setting, to assess the nature and extent of release(s) to soil or groundwater due to activities conducted at the Site, and to support remedial activities are presented in this section. The procedures used to perform soil borings, install monitoring wells, and obtain samples of soil and groundwater for the investigation at Site are summarized below. Specific investigation methodologies are detailed in the individual Technical Memoranda (TM) included in this report.

The field investigation activities were conducted in accordance with the Site Health and Safety Plan prepared for the project. Additional information regarding sample management, documentation requirements, laboratory methods, and analytical quality assurance (QA)/quality control (QC) procedures were presented in the Quality Assurance Manual (QAM) in the Voluntary Corrective Action Program Work Plan.

The following sections provide a brief description of the approach, rationale, and types of investigation activities performed to characterize the environmental setting and to delineate contamination at the Site. Details of the environmental setting investigation activities are presented in Section 3.2 and details of contaminant delineation activities are presented in Section 3.3.

3.1 Overview of Data Gaps

Hydrogeologic conditions at the Site have been studied by others in the past. Monitoring wells and soil borings were installed as part of those investigations. This existing monitoring wells, soil borings, and soil and groundwater quality information has been incorporated into the site hydrogeological conceptual model.

Boring logs, water-level measurements, and water-quality data from existing wells and borings around the Site were reviewed to develop an understanding of site hydrogeology and the relationship between observed groundwater contamination and the locations and types of potential contaminant source areas. The available information indicated that inorganic constituents, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs), primarily chlorinated solvents and associated degradation products, were detected in groundwater at the Site. However, the locations of the monitoring wells and the limited number of groundwater samples that had been collected did not provide sufficient information either to develop a complete understanding of the hydrogeology of the

Site, to assess the overall groundwater quality, or to evaluate the relationship between the groundwater quality and any potential contaminant source areas.

Following the evaluation of the existing hydrogeologic and water-quality information, data gaps were identified in several areas of the Site. The investigation activities were intended to bridge these gaps in the hydrogeologic database. Individual monitoring wells consisting of shallow (water table) wells and monitoring well clusters consisting of a shallow monitoring well and a deep or an intermediate monitoring well (as appropriate for the conditions at the Site) were installed for the purpose of defining site-wide hydrogeology. Shallow monitoring wells were installed with screens positioned across the water table for the purpose of determining water-table elevations and groundwater flow directions in the shallow zone of the aquifer, as well as for delineating contamination in specific areas.

3.2 Environmental Setting Investigations

The environmental setting investigation was designed to develop an understanding of soil and groundwater characteristics across the Site, particularly in the context of how those conditions might affect the fate and transport of potential contaminants. The objective was to define site stratigraphy and hydrogeology sufficiently to refine the conceptual hydrogeologic model for the Site. The information obtained was used to evaluate potential contaminant migration pathways and transport mechanisms in order to assess the need for, applicability, and effectiveness of potential remedial technologies.

Protocols and procedures for the completion of the environmental setting investigation tasks were presented in the Standard Operations Procedures (SOPs) included in the Voluntary Corrective Action Program (VCAP) Work Plan and are documented in the appropriate TMs included in this report.

3.2.1 Soils Investigations

The purpose of the soils characterization portion of the environmental setting investigation was to define the stratigraphy and physical properties of the unconsolidated materials in both the saturated and unsaturated zones. The stratigraphy describes the distribution of unconsolidated materials across the Site, with particular emphasis on the characteristics of those materials that affect contaminant migration pathways and transport mechanisms. The physical properties, including permeability, sorptive capacity, density, and grain size, affect contaminant migration and the evaluation, design, and performance of potential remedial measures.

This section describes the specific soil borings and sampling performed in order to define site stratigraphy and soil properties and provide an overview of hydrogeologic conditions across the Site. Soils information was gathered during direct soil sampling and during groundwater monitoring well installation. Soil borings advanced for the purpose of contaminant delineation in the unsaturated zone also served to further refine site stratigraphy and the conceptual hydrogeologic model.

The following information on the unconsolidated deposits was gathered for purposes of the environmental setting investigation:

- Description and stratigraphy of the unconsolidated materials encountered at each monitoring well location.
- Description and stratigraphy at each boring conducted to evaluate nature and extent of contamination.
- Laboratory analysis for physical and general geochemical characteristics of soil samples collected from monitoring well borings.

Soil borings were drilled at each of the monitoring wells installed as part of the groundwater characterization. Continuous soil sampling was conducted from the ground surface to the glaciolacustrine sediment surface at each location. Continuous samples were retrieved with the use of split-spoon sampling techniques. Soil samples were classified according to a modified Burmister soil classification system.

Soil borings advanced for shallow monitoring well installations were conducted with a standard hollow-stem auger drilling and continuous split-spoon sampling techniques. Soil borings advanced for intermediate and deep monitoring well installations were conducted with standard drive-and-wash and split-spoon sampling techniques. Soil borings advanced as part of the contaminant delineation borings were installed using Geoprobe® direct-push techniques. For monitoring wells, the procedures for drilling, sampling, and decontamination are included in *Technical Memorandum (TM) 1, Monitoring Well Installation and Development and Soil Sampling*. For soil borings, the procedures for drilling, sampling, and decontamination are included in*(TM) 5, Soil Boring Installation and Soil Sampling*

All spent decontamination fluids generated during drilling activities and purge water generated during monitoring well development activities for the investigation were placed in 55-gallon, closed-top drums supplied by Pratt & Whitney (P&W) for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

All soil cuttings generated during drilling activities were placed in 55-gallon, open-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

Soil samples were screened in the field for total VOCs using a portable photoionization detector (PID) or a flame-ionization detector (FID). The results of the field screening provided initial information on subsurface VOC contamination. In addition, soil samples collected as part of the contaminant delineation investigation were analyzed at the LEA Analytical Laboratory for target VOCs using a portable gas chromatograph (GC). Screening results were used to help select soil samples for analyses at an off-site analytical laboratory. The screening analyses conducted at the LEA Analytical Laboratory are described in *TM 7 Loureiro Engineering Associates Analytical Laboratory.*

3.2.2 Groundwater Investigations

The purpose of the groundwater characterization portion of the environmental setting investigation was to define groundwater elevations and aquifer characteristics across the Site. The object was to characterize the hydrogeologic characteristics and groundwater flow regime across the Site in order to understand and evaluate potential contaminant fate and transport pathways and mechanisms.

This section describes the installation of new monitoring wells (including cluster wells that are screened in deeper portions of the unconsolidated aquifer), aquifer testing methodologies, and the collection of water-level measurements. Analysis of groundwater for water quality is described in Section 3.3.2.

3.2.2.1 Installation of New Monitoring Wells

This section describes the installation of new monitoring wells designed to provide the information for refining the conceptual model of site hydrogeology. These wells were installed within soil borings described in the previous section.

In general, these new wells were planned as shallow, water-table monitoring wells to monitor hydraulic head and water quality in the upper portion of the unconsolidated aquifer. Monitoring well locations were selected not only for the purposes of obtaining hydrogeologic data, but also for obtaining water-quality information relative to potential contaminant source areas.

Well depths for newly installed water-table wells were based on the depth to groundwater at the individual well locations. These wells were screened to a depth of approximately 5 to 7 feet below the top of the water table.

Well depths for any intermediate or deep wells were determined after the soil boring at each well cluster location was completed, at which time the depths to various subsurface horizons were known and identification of aquifer materials had been completed.

3.2.2.2 Well Locations

The installation of multiple-well clusters, and shallow wells has been conducted over a period of years in response to the needs of various environmental investigations. Table 3-1 summarizes the rationale for installation of groundwater monitoring wells at the Site. A total of 2 well cluster locations, 50 shallow well locations, and 16 piezometers have been installed in the Airport/Klondike Area, to address either hydrogeologic or water-quality data gaps.

3.2.2.3 Well Construction

The monitoring wells were constructed of 2-inch diameter, Schedule 40 polyvinyl chloride (PVC) flush-threaded screen and casing, except at specific wells (i.e., NA-MW-05 through NA-MW-07, NK-MW-18, and NK-MW-19) where 0.5-inch diameter, Schedule 40 PVC Geoprobe® Prepack screen and casing were installed with the Geoprobe®. Construction materials and procedures for the standard monitoring wells were in general accordance with the *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1 and the *Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells (EPA 600/4-89/034)* (U.S. EPA/NWWA, 1989).

Screen lengths for all of the shallow monitoring wells were no longer 10 feet. Screens for the shallow wells were positioned across the water table, as observed at the time of installation, with approximately 5 to 7 feet of screen placed below the water table. For the intermediate and deep wells, 5-foot screen lengths were used. The screened intervals for the intermediate and deep wells were determined based on observations made during soil sampling (i.e., visual indications, odor, or screening for volatile organics) and the intended vertical position within the aquifer.

A description of well construction and completion procedures used, including a schematic illustration of a typical monitoring well, is found in *TM 1, Monitoring Well Installation and Development and Soil Sampling*. Upon completion, the horizontal location and elevation of the new wells and existing wells, were surveyed.

In addition to the permanent groundwater monitoring wells installed throughout the Airport/Klondike Area, Geoprobe® screenpoint samples were collected from discrete locations. Geoprobe® Screen-Point samplers are temporarily emplaced sampling devices consisting of a stainless-steel well screen driven to the desired sampling depth and unsheathed. Groundwater samples are collected as if from monitoring wells, however, the sampling devices remain in the borehole only as long as necessary to collect the sample. The techniques used to collect screenpoint groundwater samples is detailed in TM 1. Screenpoint groundwater samples were used to supplement the groundwater quality data collected from the permanent monitoring well network and to direct the location of permanent monitoring wells.

3.2.2.4 Well Development

Completed monitoring wells were developed no sooner than 72 hours after well completion to allow grout materials time to set up. Development was performed to remove fine sediment from the well, the screen openings, and filter pack and to facilitate groundwater flow to the well. Development procedures included pumping and surging using a surge block and submersible or inertial pumping methods. Development of Geoprobe® Prepack monitoring wells was performed by pumping, since the small internal diameter of these wells does not allow effective surging.

Development continued until the turbidity of water produced from the well was below specified criteria and until pH, temperature, and conductivity had stabilized. Development methods and criteria are specified in *TM 1, Monitoring Well Installation and Development and Soil Sampling.*

Equipment used inside the well casing was dedicated or decontaminated prior to use. Development water was placed in 55-gallon, closed-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

3.2.2.5 Water-Level Measurements

Groundwater elevations was measured in all newly installed wells and existing wells using an electronic water-level measurement device. Water levels were measured to the nearest 0.01 foot. Reference elevations for the monitoring wells were surveyed to the National Geodetic Vertical Datum (NGVD) of 1929. Procedures for collecting water-level measurements and surveying locations are detailed in *TM 2, Water-Level Measurements and Site Survey Data.*

Water-level measurements were collected on various occasions beginning in 1990, and continuing through 1998. Data from select measuring events were used to produce contour maps

of water-table elevations and to evaluate horizontal and vertical hydraulic gradients within the aquifer. These contour maps are presented in TM 2.

3.2.2.6 Hydraulic Conductivity Testing

During March 1990, *In situ* aquifer testing was performed at ten well locations in the Airport/Klondike Area, all of which produced usable data. All but one of the wells, SK-MW-08D, were screened across the water table. Monitoring well SK-MW-08D was screened in the glaciolacustrine sediments. Aquifer testing consisted of "slug/bail tests" to determine hydraulic conductivity of the aquifer materials. The slug tests were performed and analyzed in accordance with the Bouwer and Rice methodology.

Hydraulic conductivity values for the upper portion of the aquifer, as estimated from the test data, ranged from approximately 6.8 feet per day (0.002 centimeters per second) to 53.5 feet per day (0.019 centimeters per second). These data are consistent with published hydraulic conductivity values for similar geologic materials. However, the test data from SK-MW-01 indicated a hydraulic conductivity of approximately 0.46 feet per day ($1.6x10^{-4}$ centimeters per second). This value is approximately two orders of magnitude below the typical hydraulic conductivity values for similar materials. There is no apparent cause for this discrepancy.

Hydraulic conductivity values for the glaciolacustrine sediments, as estimated from the test data, was approximately 0.0065 feet per day ($2.3x10^{-6}$ centimeters per second). This value is consistent with published hydraulic conductivity values for similar geologic materials.

3.2.3 Surface Water / Groundwater Interaction

Surface water/groundwater interactions in the Airport/Klondike Area were estimated by measuring the difference in water levels between the upper aquifer and the surface water body. Three surface water piezometers, SK-PZ-01 through SK-PZ-03, have been installed in Pewterpot Brook in the South Klondike Area. These piezometers begin in the area just west of the Virgin Product Storage Area and continue south to approximately the southeast corner of the airport. These three piezometers allow simultaneous measurement of the stage of Pewterpot Brook and the water table elevation at the same location, and therefore, an estimation of the surface water/groundwater interaction in that area.

Two surface water piezometers, NK-PZ-01 and NK-PZ-02, have been installed in unnamed tributary to Pewterpot Brook in the North Klondike Area. These piezometers are located in the portion of the surface water immediately west of the X-430 Area. These two piezometers allow simultaneous measurement of the stage of the unnamed tributary and the water table elevation at

the same location, and therefore, an estimation of the surface water/groundwater interaction in that area.

In the South Klondike Area, measurements of the stage of the brook and water-table elevation have been made during the water level gauging events of 1997. These data have been used to calculate the apparent direction of groundwater flow between the brook and the upper aquifer. These data are presented in *TM 2 Water-Level Measurements and Site-Survey Data.*

During both the June 1997 and November 1997 events, the water-level measurements indicate that Pewterpot Brook is a gaining stream in the reach between SK-PZ-01, west of the Virgin Product Storage Area, southward to SK-PZ-02. That is, the elevation of the water table is higher than the stage of the stream and groundwater would tend to flow from the aquifer into the stream. During the June 1997 event, the data collected from piezometer SK-PZ-03 indicated that the stream was a losing stream in that portion of the stream, but was a gaining stream during the November 1997 gauging event.

3.2.4 Surface Water and Sediment Investigations

Surface water and sediment samples have been collected from selected locations throughout the Site to evaluate the potential impacts of site activities on those media. A total of thirty-five surface water and sediment sampling locations have been established in the Airport/Klondike Area: two in the North Airport Area, six in the North Klondike Area, ten in the South Airport Area, and seventeen in the South Klondike Area. These surface water/sediment locations have been situated in Willow Brook, Pewterpot Brook, and the various unnamed tributaries to these streams. The locations of these sampling points has been chosen to provide relatively complete coverage of the surface water bodies on the Site. These surface water/sediment sampling locations have been surveyed to provide a horizontal location data.

In some cases, the surface water/sediment sampling locations are simple staff gauges, from which surface water elevation data can be determined. In other cases the surface water/sediment sampling locations are stream piezometers from which both surface water and groundwater elevation data can be determined.

Sediment sampling during the most recent investigation activities was conducted in general accordance with the LEA SOP *Standard Operating Procedure for Sediment Sampling in Shallow Rivers and Ponds*. Sediment samples were collected at the same spatial locations as surface water samples. Sediment samples were collected using pre-cleaned, stainless steel hand trowels or scoops, or hand augers. After collection, the sampling device was brought to the surface and

the sediment was transferred to pre-labeled laboratory-supplied sampling containers using stainless-steel spatulas.

Surface water samples were collected by first identifying the appropriate sampling location. The sampling location was approached from a downstream direction, disturbing the bottom sediments as little as possible, and the depth to the surface water surface from the surveyed reference point was gauged. Sample containers were filled directly from the stream flow by immersion of the pre-labeled laboratory-supplied sample containers into the stream waters. Sample information, including date and time, location, sample number, depth to the surface water, and pertinent observations were recorded on the appropriate field forms.

After collection, all samples were placed into iced coolers for transportation to the analytical laboratory under chain-of-custody control.

Specific data and a more detailed discussion of the sample collection techniques employed in collecting surface water and sediment samples is presented in TM 6 *Surface Water and Sediment Sampling*.

3.3 Contaminant Delineation Investigation

The primary objectives of the contaminant delineation investigation were to define the nature and extent of contamination in potentially affected media across the site. The approach consisted of two principal phases:

- Identification and nature of contamination
- Delineation of the extent of contamination, as appropriate.

This section is organized by the different media that potentially have been affected by releases of hazardous material at the facility. Soil is discussed first, followed by groundwater. Detailed discussions of the field methodologies employed in these investigations, standard operating procedures for the field activities, and descriptions of the results of the contaminant delineation investigation are included in the appropriate TMs and USTMs presented in this report.

3.3.1 Soils Contaminant Delineation Investigations

This section describes the scope of sampling activities that were conducted to define the nature and extent of soils contamination in the unsaturated zone across the site. Any contamination detected could indicate potential source areas for future migration to groundwater and/or surface water. The data collected through this investigation was also used in developing the site-wide

conceptual hydrogeologic model. The nature and extent of contamination present in the saturated zone is addressed in Section 3.3.2.

The approach to the delineation of contamination varied across the Site depending on the probability of contamination, relative impact of potential contamination, types of contaminants, and the physical mechanisms of contamination. The soil sampling approach varied in terms of the number and spatial distribution of samples and the types of analyses performed. A detailed discussion of the sampling approach at each potential contaminant source area is presented in the TMs and Unit-Specific Technical Memoranda (USTMs) provided in this report.

The general approach to the delineation of contamination in unsaturated zone soils was as follows. The nature of contamination at individual areas or environmental units was assessed through initial sampling. If results indicated that contaminants were present, an evaluation of the need for additional sampling was made. When appropriate, the extent of contamination was assessed through a supplemental boring and soil sampling program. The supplemental sampling program assessed the horizontal and vertical distribution of contaminants and provided information to evaluate potential remedial measures as necessary.

The nature of contaminants in each area was characterized by analyzing soil samples for those constituents that have the potential to be present in the subsurface due to historical activities in that particular area. The results of the analyses performed during the initial round of sampling were used to select indicator parameters for any sampling to determine the extent of contamination that was or would have been undertaken. Typically, an analytical method was eliminated if data indicated that a constituent had not been detected or was significantly below reference levels. The initial analytical results for constituents such as metals and SVOCs from a specific environmental unit was typically deemed to be sufficient to adequately characterize the nature and extent of those constituents in that unit.

Screening of soil samples using a portable gas chromatograph (GC) was conducted for target VOCs at those locations where VOCs were potential contaminants. Screening results were used to aid in the selection of soil samples that were to be submitted for more comprehensive analysis at an offsite laboratory. Screening level analytical data were collected for soil samples collected from most of the environmental units at the Site.

The initial sampling program at a given environmental unit was designed to characterize the nature of contaminants present in soils at each location. This characterization consisted of sampling soils within each area and analyzing the samples for the constituents noted in the USTMs presented in this report. A list of all potential constituents for which analysis might be

performed was presented in the Voluntary Corrective Action Program Work Plan, along with the analytical methods and practical quantitation limits for the individual constituents.

After the initial round of sampling and analysis was performed in a given area, one of two subsequent steps, was generally taken.

- If it was not clearly evident that additional investigation was necessary to characterize the nature and extent of contamination at that unit, no further investigation was undertaken at that time.

- If the presence of contamination was confirmed above reference levels and/or additional information was clearly required in order to adequately characterize the extent of the release, to determine whether further action was warranted, and/or to evaluate appropriate subsequent actions to address the release, supplemental sampling was conducted in the area.

Any supplemental sampling deemed necessary was designed to assess the vertical distribution and the horizontal extent of contaminants in the unsaturated zone to evaluate potential remedial measures. For organic compounds, the list of indicator parameters included the class of organic compounds detected during the initial sampling. For example, if PCE was detected, then other chlorinated VOCs, such as degradation products, were included in the list of indicator parameters. For selected areas, analysis of Synthetic Precipitation Leaching Procedure (SPLP) extract for metals was conducted on selected samples for evaluating the leachability of those inorganic constituents. If the concentrations of inorganics was representative of background concentrations and did not indicate a release, SPLP analyses were not conducted.

3.3.2 Groundwater Contaminant Delineation Investigations

This section describes the scope of sampling activities that were conducted to define the nature and extent of groundwater contamination in the saturated zone across the Site. Any contamination detected in groundwater could indicate potential source areas for future migration to surface water and/or to volatilize to the air. The data collected through this investigation was also used in developing the site-wide conceptual hydrogeologic model.

The approach to the delineation of groundwater contamination varied across the Site depending on the probability of contamination, relative impact of potential contamination, types of contaminants, and the physical mechanisms of contamination. The groundwater sampling approach varied in terms of the number and spatial distribution of samples and the types of

analyses performed. A detailed discussion of the sampling approach at each potential contaminant source area is presented in the TMs and USTMs provided in this report.

The nature of contamination at individual areas or environmental units was assessed through initial soil sampling, and, where available, from groundwater quality data. If results indicated that contaminants were present, an evaluation of the need for additional sampling was made. When appropriate, the extent of contamination was assessed through a supplemental groundwater sampling program. The supplemental sampling program assessed the horizontal and vertical distribution of contaminants and provided information to evaluate potential remedial measures.

The nature of contaminants in each area was characterized by first analyzing soil samples for those constituents that had the potential to be present in the subsurface due to current or historical activities in that particular area and by reviewing any available groundwater quality data. The results of the analyses performed during the initial round of sampling were used to select indicator parameters for any sampling to determine the extent of contamination that was or would have been undertaken. An analytical method was eliminated if data indicated that a constituent had not been detected or was significantly below reference levels.

The initial sampling program at a given environmental unit was designed to characterize the nature of contaminants present in the groundwater at each location. This characterization consisted of sampling the groundwater at each area and analyzing those samples for the constituents noted in the USTMs presented in this report. A list of all potential constituents for which analysis might be performed was presented in the Voluntary Corrective Action Program Work Plan, along with the analytical methods and practical quantitation limits for the individual constituents.

After the initial round of sampling and analysis was performed in a given area, one of two subsequent steps, was generally taken.

- If it was not clearly evident that additional investigation was necessary to characterize the nature and extent of contamination in the groundwater at that unit, no further investigation was undertaken at that time.

- If the presence of contamination was confirmed above reference levels and/or additional information was clearly required in order to adequately characterize the extent of the impacts to groundwater, to determine whether further action was warranted, and/or to evaluate appropriate subsequent actions to address the contamination, supplemental groundwater sampling was conducted in the area.

Any supplemental sampling deemed necessary was designed to assess the horizontal and vertical extent of contaminants in the groundwater and the likely source of those contaminants to evaluate potential remedial measures. For organic compounds, the list of indicator parameters included the class of organic compounds detected during the initial sampling. For example, if PCE was detected, then other chlorinated VOCs, such as degradation products, were included in the list of indicator parameters.

TABLES

Table 3-1 Monitoring Well Locations and Rationale Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut	
Monitoring Well ID	**Rationale/General Location**
NA-MW-01	Areal coverage - North Airport
NA-MW-02	Areal coverage - North Airport
NA-MW-03	Areal coverage - North Airport
NA-MW-04	Areal coverage - North Airport
NA-MW-05	Former Pickle Company
NA-MW-06	Former Pickle Company
NA-MW-07	Former Pickle Company
NA-PZ-01	Water levels - North Airport
NA-PZ-02	Water levels - North Airport
NA-PZ-03	Water levels - North Airport
NA-PZ-04	Water levels - North Airport
NA-PZ-05	Water levels - North Airport
NA-PZ-06	Water levels - North Airport
NA-PZ-07	Water levels - North Airport
NA-PZ-08	Water levels - North Airport
NA-PZ-09	Water levels - North Airport
NA-PZ-10	Water levels - North Airport
NA-PZ-11	Water levels - North Airport
NA-PZ-12	Water levels - North Airport
NK-MW-01	Northeastern property corner
NK-MW-02	Suntan Area
NK-MW-03	Suntan Area
NK-MW-04	Suntan Area
NK-MW-05	Suntan Area
NK-MW-06	Soil storage area
NK-MW-07	Former tank farm
NK-MW-08	Former PCB Storage Building
NK-MW-09	Former PCB Storage Building
NK-MW-10	Former PCB Storage Building
NK-MW-11	Former PCB Storage Building
NK-MW-12	South of Suntan Area Access Road
NK-MW-13	X-314 Test Stand
NK-MW-14S	X-410 and X-412 Test Stands
NK-MW-15S	Western North Klondike areal coverage
NK-MW-16	X-430 through X-436 Test Stands Steel Tank Area
NK-MW-17	North Klondike Soil Piles
NK-MW-18	X-430 Test Stand
NK-MW-19	X-401 Test Stand

Table 3-1 Monitoring Well Locations and Rationale Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut	
Monitoring Well ID	**Rationale/General Location**
NK-PZ-01	Water levels - North Klondike
NK-PZ-02	Water levels - North Klondike
SA-MW-01	Fire Training Area
SA-MW-02I	Contractor Storage Area
SA-MW-03	Fire Training Area
SA-MW-04	Contractor Storage Area & Former Soil Stockpile
SA-MW-05I	Monitor base of aquifer at SA-WM-05S
SA-MW-05S	Contractor Storage Area
SA-PZ-01	Water levels - South Airport
SA-PZ-02	Water levels - South Airport
SK-MW-01	South Klondike Graoundwater Quality
SK-MW-02	South Klondike Graoundwater Quality
SK-MW-03	South Klondike Graoundwater Quality
SK-MW-04	South Klondike Graoundwater Quality
SK-MW-05	Virgin Product Storage Area
SK-MW-06	Fire Training Area
SK-MW-07	Chemical Storage Building in Linde Area
SK-MW-08D	Base of aquifer at SK-MW-08S
SK-MW-08S	North-South Airport Area
SK-MW-09	Stratigraphy - Eastern property corner
SK-MW-10	Stratigraphy - Eastern property corner
SK-MW-11	Quonset Hut
SK-MW-12	Fire Training Area
SK-MW-13	Southeast property corner
SK-MW-14I	Storage Yard 3
SK-MW-15I	Former drum storage area south of Cryogenics Builidng
SK-MW-16	Fire Training Area and Tie-Down Area
SK-MW-19	Virgin Product Storage Area
SK-MW-20	Virgin Product Storage Area
SK-MW-21	Virgin Product Storage Area
SK-MW-22	Virgin Product Storage Area
SK-MW-23	Virgin Product Storage Area
SK-MW-24	Virgin Product Storage Area

DRAFT

TECHNICAL MEMORANDUM 10
TEST PIT INSTALLATION AND SOIL SAMPLING

SUMMARY
SITE INVESTIGATION AND REMEDIATION REPORT
AIRPORT/KLONDIKE AREA
AT
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TABLES

DRAWINGS

ATTACHMENTS

Acronyms

AEL	Averill Environmental Laboratory, Inc.
DEP	State of Connecticut Department of Environmental Protection
DPH	State of Connecticut Department of Public Health
FID	Flame Ionization Detector
F&O	Fuss & O'Neill, Inc.
H&A	Haley & Aldrich, Inc.
LEA	Loureiro Engineering Associates, Inc.
M&E	Metcalf & Eddy, Inc.
mg/l	milligrams per liter
NTU	Nephelometric Turbidity Unit
P&W	Pratt & Whitney
PID	Photoionization Detector
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QNT	Quanterra Environmental Services, Inc.
RCSA	Regulations of Connecticut State Agencies
SOP	Standard Operating Procedure
TM	Technical Memoranda
USTM	Unit-Specific Technical Memorandum
VOC	Volatile Organic Compound

1. INTRODUCTION

1.1 Purpose and Objective

This Technical Memorandum (TM) presents the methodology and results of the test pit installation and the soil sampling methodology used in the Airport/Klondike Area (Site) of the Pratt & Whitney (P&W) facility located at 400 Main Street (Main Street facility) in the Town of East Hartford, Connecticut. Test pits were installed as part of the Site investigation activities to characterize the nature and the distribution of contaminants in the unconsolidated materials at the Site.

1.2 Background

The Airport/Klondike Area is located on the eastern portion of the P&W Main Street facility on the east side of the main plant, north of Brewer Street and south of Silver Lane. The Airport/Klondike Area consists of four study areas that include the North and South Airport Areas and the North and South Klondike Areas. Previous investigations at the Site performed from 1990 through 1993 resulted in the installation and sampling of soil borings, groundwater monitoring wells, and temporary wellpoints throughout the Airport/Klondike Area.

1.3 Scope

This TM covers the installation, sampling, and rationale for the test pits installed in the Airport/Klondike Area. The methods and techniques discussed are those used by Loureiro Engineering Associates, Inc. (LEA) during the period from approximately 1994 through 1998. These methods and techniques have also been used, to a greater or lesser extent, by other consultants and contractors working at the Site at various times. This TM does not cover specific chemical analyses of soil samples collected during the test pits installation as these data are discussed in the appropriate Unit-Specific Technical Memorandum (USTM).

1.4 General Geologic and Hydrogeologic Conditions

The geologic and hydrogeologic characteristics of the Site are discussed in detail in the main body of this report. In general, the surficial materials in which the majority of the test pits were completed, consist of medium to fine grained sands with trace levels of fine gravels and coarse sands. These sediments are generally post-glacial, fluvial deposits associated with the Connecticut River, although in many places the upper portion of these sediments have been anthropogenically disturbed during on-site construction activities. Beneath the fluvial sediments

are glaciolacustrine sediments, primarily laminated silts and clays, associated with glacial Lake Hitchcock. The basal sediment layer over most of the area is glacial till and stratified drift. Bedrock in the general East Hartford area consists of Triassic Age, interbedded arkoses and basalts. Bedrock in the area has a general slight dip eastward cut by widespread steep faults.

The regional drainage basin is the Upper Connecticut River Basin. Regional flow in the unconsolidated materials in this part of the basin is to the west, towards the Connecticut River. Local groundwater flow is also controlled to some extent by local drainage sub-basins and topography. The upper portion of the unconsolidated sediments serves as the primary aquifer in the area. Groundwater flow in the bedrock is primarily within fractures and fault planes, and to a lesser extent within the rock matrix. The local bedrock aquifer would be adequate as a residential water supply source, but groundwater yields are typically too low to be of commercial or industrial use.

1.5 Test Pit Locations and Rationale

Test pits have been installed at the Site over the course of several years as parts of a variety of environmental investigations. Test pits have been installed both as part of sitewide investigations of soil quality, during investigations of specific environmental units and areas, and as part of the remedial activities performed at the Site. In many cases, these test pits were located on the basis of historical information regarding Site operations, on the basis of field observations made during numerous Site walkovers and visits, and on information gathered during other phases of the environmental investigation of the Site particularly of the results of the focused soil boring program. Historical operations have been reported in various reports, deduced from aerial photographs, engineering drawings and plans, and reported in various P&W internal memoranda. More details on historical operations are included in the main body of this report as well as in the USTMs.

2. METHODOLOGY

This section presents the methods and techniques used to install the test pits at the Site. These methods were used by LEA. Reports from previous environmental contractors do not include references to test pit installations.

2.1 General Procedures

Test pits in the Airport/Klondike Area have been installed in various locations generally to support subsequent soil excavation activities but also to supplement the focused soil boring program. Test pits have been installed at the Site since approximately 1996 by LEA. No indication of historical test pits has thus far been identified. This TM describes the general procedures that were used during the installation of test pits at the Site. Also discussed are any variations and exceptions to the general methodology and the reasons why these variations and exceptions were required.

The test pits installed during the most recent investigation activities were in general accordance with the procedures described in LEA Standard Operating Procedures (SOP) *Standard Operating Procedure for Soil Sampling*, and the LEA SOP *Standard Operating Procedure for Geologic Logging of Unconsolidated Sedimentary Materials*.

2.2 Test Pit Excavation Methods

Test pits were excavated using commercial excavators under the direction of LEA field personnel. All heavy equipment was operated by experienced operators. For the removal activities, excavations were typically begun at a known septic tank system or dry well location by initially excavating the cover. The excavation was continued until the septic tank or dry well structure was exposed and subsequently removed.

To supplement the focused soil boring program, excavations were typically begun in a location where a broader view of the subsurface materials was desired. These areas included the former Silver Lane Pickle Company Soil Piles. the North Klondike Undeveloped Land Soil Piles and Storage Area, the South Klondike Rubble Piles, and the Firing Range.

For the removal activities, soil excavation at each test pit location continued laterally until all visually contaminated soil was excavated. For the investigation activities, soil excavation at each test pit location continued laterally until a large enough area was exposed for inspection and sample collection. Soil excavation was generally limited vertically by the depth to the

groundwater table. For most of the test pits, soil excavation was concluded at the water table, in some cases additional soil was removed in order to facilitate the removal of a structure, or when infiltration of groundwater was so slow that the true phreatic surface was not discovered until the following day. Soil samples were collected from the base and sidewalls of the excavations to confirm that the excavation was inclusive of all contaminated soil. In the event exceedances of any applicable regulatory standard were detected in a sample, additional soil was excavated in the direction of the exceedance, and the new perimeter of the test pit was re-sampled.

For removal activities, excavated soil was placed into lined, covered roll-off containers to await off-site disposal. Where possible, separate roll-off containers were used for each separate excavation to prevent mixing of the soils. The specifics of the soil removals is discussed in *TM 14, Soil Excavation Activities*. For investigation activities, excavated soil was placed adjacent to the test pit and then used to backfill the excavation.

2.3 Soil Sampling Methods

Soil samples collected from test pits were sampled in general accordance with the procedures described in the LEA SOP *Standard Operating Procedure for Soil Sampling*. Soil sampling was performed after the completion of the test pit excavation. Soil sampling procedures were similar for all test pits.

After the completion of the test pit, soil samples were collected from the excavation sidewalls and bottom, as appropriate, directly into laboratory supplied, 4 ounce, Teflon®-lidded, sample containers. The soil samples were grab samples collected approximately 3 to 6 inches below the surface. The soil samples were typically located randomly along the excavation face. When indications of potential contamination (i.e., staining, odors, discoloration, etc.) were observed, the grab sample was collected judgmentally from the area that represented potential contaminated conditions. All soil samples were examined by the attending LEA field personnel for indications of contamination, such as the presence of visible free-phase petroleum, visible staining, or the presence of odors. Soil samples were collected directly into laboratory-supplied sample containers with Teflon®-lined lids for submission to an off-site laboratory for possible analysis. After collection, soil samples were typically field headspace screened with either a photoionization detector (PID) or flame ionization detector (FID) for the presence of volatile organic compounds (VOCs).

Soil samples were collected using pre-cleaned stainless-steel spatulas. Filled sample containers were labeled using pre-printed, pre-numbered adhesive labels with the sampling date and time

hand recorded by the sampler. The filled sample containers were placed into iced sample coolers for the remainder of the sampling day.

Occasionally, samples were collected for the LEA Analytical Laboratory. A 5-gram aliquot of the soil was collected directly into a 40-milliliter vial with a Teflon® septum for analysis for target VOCs. Prior to collecting the sample, the analytical balance was tared against the weight of the vial. Soil samples were collected directly into the vials and the vials plus the soil were weighed to determine the weight of the soil sample collected. The vials were then filled to 30-milliliters volume with pre-preserved sampling water supplied by the LEA Analytical Laboratory. Filling of the vials was done by placing the vials into a wooden or plastic block, drilled to accept the vial, and sized to provide a top surface level with the 30-milliliter level of the vials. Filled sample vials were labeled using pre-printed, pre-numbered adhesive labels with the sampling date and time hand recorded by the sampler. The filled sample vials were placed into iced sample coolers for the remainder of the sampling day. The specifics of the analysis by the LEA Analytical Laboratory are discussed in *TM 7, Loureiro Engineering Associates Analytical Laboratory.*

2.4 Analytical Parameters

Analytical parameters for soil samples collected from test pits installed in the Airport/Klondike Area were selected on the basis of historical information regarding area-specific operations. Specific contaminants of concern were chosen based on the chemicals and materials known or suspected to have been used in the area, and historical information gathered during previous environmental investigations.

Specific analyses performed on soil samples, and the rationale for selecting specific samples for analysis, are discussed in the appropriate USTMs. The analytical parameters selected for all soil samples are presented in Table TM10-1. Table TM10-1 also presents information regarding which soil samples were submitted for laboratory analyses and whether any of the target analytes for the analyses selected were detected. Table TM10-1 indicates both sample information including location identification, sample number, sample date, sample interval, and sample class (i.e., SB - soil boring sample, SPB - soil boring sample to be remediated, GW - groundwater sample) along with analysis information. The analysis information is indicated by analytical class (i.e., volatile organics, semivolatile organics, etc.) with a blank for samples not analyzed for a particular analytical class, an "x" or samples analyzed but no analytes in the analytical class (or group) over the detection limit, and an "X" for samples analyzed with at least one analyte in the analytical class over the detection limit. The miscellaneous category under the analysis

information usually indicates analysis for total petroleum hydrocarbons (TPH). Sample location identifiers are discussed in Section 2.10.

2.5 Quality Assurance/Quality Control Procedures

Several Quality Assurance (QA) samples were collected to confirm the reliability and validity of the field data gathered during the Site investigation. Duplicate samples were used to provide a measurement of the sampling consistency and an estimate of variance and bias. Trip and equipment blanks were used to provide a measurement of cross-contamination sources, decontamination efficiency, and other potential errors that can be introduced from sources other than the sample.

Trip blanks were used on every sampling day that VOC samples were collected. Trip blanks were supplied by the analytical laboratory for each cooler/sampling event.

Equipment blanks submitted to off-site analytical laboratories were collected at the rate of approximately one equipment blank for every twenty soil samples submitted for analysis. Equipment blanks submitted to off-site laboratories were collected using laboratory-supplied distilled, de-ionized water and field decontaminated sampling equipment. Equipment blanks submitted to the LEA Analytical Laboratory were collected using the laboratory-supplied sampling water.

Specific information regarding QA/QC sampling and analysis is provided in *TM 15, Quality Assurance/Quality Control.*

The possession of samples, including QA/QC samples, was traceable from the time the samples were collected until they were analyzed. Chain-of-custody procedures were used to maintain and document sample possession from collection through analysis. The following documents identify samples and document possession:

Sample labels
Chain-of-custody record forms
Field notebooks/Field Sampling Records

The field sampler was responsible for the care and custody of the samples collected until they are transferred under the chain-of-custody procedures. Samples collected for analysis at the LEA Analytical Laboratory were maintained under separate chain-of-custody and in separate coolers from samples collected for submission to off-site analytical laboratories.

2.6 Test Pit Logging

After the retrieved soil was collected for laboratory analysis and field headspace screening, the attending LEA field personnel also visually described the soils using a modified Burmister Classification System. The geologic descriptions were recorded on standardized "Test Pit Log" forms in general accordance with the LEA SOP *Standard Operating Procedure for Geologic Logging of Unconsolidated Sedimentary Materials*.

The general data recorded for the subsurface materials encountered included the estimated primary grain size ranges according to the Burmister Classification Scheme, secondary grain size ranges, color, relative degree of water saturation, and visible sedimentary structures. In addition, the presence of extraneous materials and foreign objects was also recorded, as was the presence of odors or staining. Copies of available test pit logs are included in Attachment A to this TM.

2.7 Test Pit Abandonment

After the completion of soil sampling and geologic logging, test pits completed as part of the remediation activities were generally not abandoned, but were fenced and/or covered to provide personnel protection, and left open until analytical data became available. The rationale for leaving the test pits open was to facilitate additional soil removal, should it be necessary. Upon receipt and evaluation of the analytical data, additional soil was removed and the excavation backfilled with material from an off-site borrow source. After excavation, the location of each test pit was surveyed to provide horizontal location data. Test pit locations were typically surveyed within two weeks of completion.

2.8 Historical Test Pits

There is no available information regarding the installation of historical test pits in the Airport/Klondike Area.

2.9 Decontamination of Materials and Equipment

The purpose of consistent decontamination procedures was to prevent the potential spread of contamination between test pits and samples and from the immediate work area around the test pit. All equipment and materials placed into a test pit, or associated with the collection and sampling of soil from a test pit, were decontaminated prior to initiating the excavation and between individual samples, as appropriate. Decontamination procedures are presented in the LEA SOP *Standard Operating Procedure for Hollow Stem Auger Soil Borings*. Backhoes were

decontaminated by steam-cleaning prior to initiating any excavations at the Site. Steam-cleaning took place at a decontamination pad. The decontamination pad was typically a portable plastic or metal basin of sufficient volume to hold the backhoe bucket and any associated tooling.

Sampling equipment, such as stainless steel spatulas, were decontaminated between uses in the field at the excavation site. Manual decontamination took place at the excavation site using a portable decontamination system, consisting of small, portable trough to contain over-spray and potentially spilt decontamination fluids, and decontamination solutions in individual 5-gallon buckets, or spray containers, as appropriate. The sampling equipment was decontaminated using the following procedure:

- Brush off gross soil particles.
- Wash and scrub equipment with phosphate-free detergent.
- Rinse equipment with deionized water.
- Rinse equipment with dilute nitric acid solution.
- Rinse equipment in deionized water.
- Rinse equipment with dilute methanol/water solution.
- Rinse equipment in deionized water.
- Allow equipment to air dry.

The decontamination water was maintained in 5-gallon buckets during use, and transferred to 55-gallon drums for disposal by P&W. LEA field personnel were responsible for preventing cross-contamination between soil samples collected for laboratory analysis.

2.10 Test Pit Location Identifiers

Test pits, as well as monitoring wells, piezometers, stream gauges, surface water and sediment sampling locations, and soil borings, have been provided with location identifiers using a systematic method to prevent duplication of location identifiers. The system of location identifiers provides a relatively easy means of finding the referenced locations on site maps. All parts of the P&W East Hartford facilities, including the Andrew Willgoos Gas Turbine Laboratory, the Colt Street facility, and the Main Street facility, have been divided into twenty-nine study areas. Each of the study areas has been assigned two-letter identifiers based upon the common name for the area. These two-letter designations are presented in Table TM10-2.

In addition, each type of sampling location has been assigned a two-letter designation to identify the major sample type for a given sampling location. The two-letter designations for the various types of sampling locations are also presented in Table TM10-2. Because of the large areas

involved, the study areas that encompass the Airport/Klondike Area include the North and South Airport Areas and the North and South Klondike Areas. All monitoring and sampling locations have been given a location identifier based on their location in the Airport/Klondike Area, the type of sampling or monitoring location, and finally a sequential numeric identifier based upon the specific type of location. All test pit locations are presented on Drawing TM10-1, which covers the entire Airport/Klondike Area.

Because multiple samples were collected from a given test pit, an additional location identifier code was added to indicate which portion of the test pit the specific sample was collected from. This additional code took the form of a single letter appended to the end of the test pit identifier to indicate whether the sample was collected from the base or a wall, and, if from a wall, which wall. The specific codes associated with the test pit samples were: "N" for northern sidewall samples; "E" for eastern sidewall samples; "S" for southern sidewall samples; "W" for western sidewall samples; and, "B" for bottom samples. When additional soil removal was warranted, the subsequent soil samples were typically identified with additional suffixes such as "S1" for the first additional sample along a sidewall or excavation base, "S2" for the second, and so on.

2.11 Waste Management

All spent decontamination fluids generated during test pit excavation activities for the investigation were placed in 55-gallon, closed-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the test pits contributing to each were listed, and the information tracked to aid in waste characterization and disposal.

All excavated soil from removal activities was placed into separate roll-off containers supplied by P&W for subsequent off-site disposal by P&W. The roll-off containers were labeled, the test pits contributing to each were listed, and the information tracked to aid in waste characterization and disposal. If necessary, roll-off containers were sampled, and the analytical data used to characterize the soil for disposal. Soil excavation and disposal are discussed in TM 14 *Soil Removal Activities*.

2.12 Health and Safety

LEA field personnel conducted field activities in accordance with the LEA Site Health and Safety Plan that was prepared for all of the investigation activities performed at the Site. In general, soil boring advancement was conducted in modified Level D personal protective equipment (PPE) consisting of safety glasses, surgical or nitrile gloves, steel-toed shoes, and hard hats. Excavation contractors employed as subcontractors operated in accordance with their

specific health and safety plans.

3. RESULTS

A total of thirty-two test pits have been excavated in the Airport/Klondike Area since August 1996. The breakdown of the test pits excavated, the associated environmental unit, the date of excavation, and the approximate volume of soil excavated is presented in Table TM10-3. In sum, three test pits were excavated in the North Airport Area, nineteen test pits were excavated in the North Klondike Area, and ten test pits were excavated in the South Klondike Area. No test pits were excavated in the South Airport Area. Discussions of the specific test pits and the rationale for their installation are discussed in the relevant USTMs.

Most of the test pits excavated in the Airport/Klondike Area were associated with the removal activities, particularly the removal of septic systems or dry wells in the vicinity of former test stands or other structures in the area. Some of the test pits were associated with the investigative activities. To supplement the focused soil boring program, excavations were typically begun in a location where a broader view of the subsurface materials was desired. These areas included the former Silver Lane Pickle Company Soil Piles. the North Klondike Undeveloped Land Soil Piles and Storage Area, the South Klondike Rubble Piles, and the Firing Range.

Soil samples were collected from the base and the sidewalls of the test pits and submitted for laboratory analyses to determine the extent of contamination and to determine whether the limits of excavation had been reached. Soil excavated from the test pits associated with the removal activities was placed in roll-off containers and disposed of off-site. Soil excavated from test pits associated with the investigative activities was used to backfill the excavation. The test pit locations were surveyed, and the test pits themselves have been backfilled with clean fill and abandoned.

TABLES

Table TM1b .

DRAFT

SUMMARY OF TEST PIT SOIL SAMPLING AND ANALYSES

Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous
NA-TP-01B	1020910	11/01/96	6.0		SS	x								
NA-TP-01E	1020907	11/01/96	3.0		SS	x								
NA-TP-01N	1020906	11/01/96	2.2		SS	x								
NA-TP-01S	1020908	11/01/96	2.5		SS	x								
NA-TP-01W	1020909	11/01/96	3.0		SS	x	x					X		x
NA-TP-02B	1021018	11/01/96	6		SS	x	x					X		X
NA-TP-02E	1020912	11/01/96	2.2		SS	x								
NA-TP-02N	1020911	11/01/96	2.3		SS	x								
NA-TP-02S	1020913	11/01/96	3.0		SS	x								
NA-TP-02W	1020914	11/01/96	2.2		SS	x								
NA-TP-03B	1021023	11/01/96	6.2		SS	x	x					X		X
NA-TP-03E	1021020	11/01/96	4		SS	x								
NA-TP-03N	1021019	11/01/96	4		SS	x								
NA-TP-03N	1021024	11/01/96	4		SS	x								
NA-TP-03S	1021021	11/01/96	4		SS	x								
NA-TP-03W	1021022	11/01/96	3.3		SS	x								
NK-TP-01B	1017462	08/19/96	9		SS	x	x					X		
NK-TP-01E	1017465	08/19/96	5.1		SS	x	x					X		
NK-TP-01N	1017466	08/19/96	5.2		SS	x								
NK-TP-01S	1017463	08/19/96	5.1		SS	x								
NK-TP-01W	1017464	08/19/96	5.6		SS	x								
NK-TP-02B	1017467	08/19/96	9.2		SS	x	x					X		
NK-TP-02E	1017471	08/19/96	5.5		SS	x								
NK-TP-02N	1017469	08/19/96	5.2		SS	x	X					X		
NK-TP-02S	1017468	08/19/96	5.3		SS	x								
NK-TP-02W	1017470	08/19/96	5.3		SS	x								
NK-TP-03B	1017472	08/19/96	7.2		SS	x								
NK-TP-03E	1017477	08/19/96	4.0		SS	x	x					X		
NK-TP-03NE	1017474	08/19/96	4.4		SS	x								
NK-TP-03NW	1017473	08/19/96	4.3		SS	x								
NK-TP-03S	1017475	08/19/96	4.4		SS	x	x					X		
NK-TP-03W	1017476	08/19/96	5.1		SS	x								
NK-TP-04B	1020895	11/01/96	6		SS	x	x	x			x	X		X
NK-TP-04E	1020894	11/01/96	3		SS	x								
NK-TP-04S	1020893	11/01/96	3		SS	x								
NK-TP-04W	1020892	11/01/96	4		SS	x								
NK-TP-05B	1020900	11/01/96	6		SS	x	x	x			x	X		x
NK-TP-05E	1020897	11/01/96	3		SS	x	x					X		X
NK-TP-05N	1020896	11/01/96	2		SS	x								
NK-TP-05S	1020898	11/01/96	2.5		SS	x								
NK-TP-05W	1020899	11/01/96	2.6		SS	x								

Table TM1v _ *DRAFT*

SUMMARY OF TEST PIT SOIL SAMPLING AND ANALYSES

Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous
NK-TP-06B	1020905	11/01/96	6		SS	x	x					X		x
NK-TP-06E	1020902	11/01/96	2		SS	x								
NK-TP-06N	1020901	11/01/96	3		SS	x								
NK-TP-06S	1020903	11/01/96	2		SS	x								
NK-TP-06W	1020904	11/01/96	2.2		SS	x								
NK-TP-08B	1635125	06/09/97			SS		x	x				X		X
NK-TP-08E	1635123	06/09/97			SS		x	x				X		x
NK-TP-08N	1635121	06/09/97			SS		x	x				X		x
NK-TP-08S	1635122	06/09/97			SS		x	x				X		x
NK-TP-08W	1635124	06/09/97			SS		x	x				X		x
NK-TP-09B	1635131	06/09/97			SS		x	x			x	X		x
NK-TP-09E	1635128	06/09/97			SS		x	x			x	X		x
NK-TP-09N	1635126	06/09/97			SS		x	x			x	X		x
NK-TP-09S	1635127	06/09/97			SS		x	x			x	X		x
NK-TP-09W	1635129	06/09/97			SS		x	x			X	X		x
NK-TP-09W	1635130	06/09/97			SS		x	x			x	X		x
NK-TP-10E1	1635134	06/09/97			SS		x	x				X		x
NK-TP-10E2	1635135	06/09/97			SS		x	x				X		x
NK-TP-10N	1635132	06/09/97			SS		x	x				X		x
NK-TP-10S	1635133	06/09/97			SS		x	x				X		x
NK-TP-10W1	1635136	06/09/97			SS		x	x				X		x
NK-TP-10W2	1635137	06/09/97			SS		x	x				X		x
NK-TP-11E	1635146	06/09/97			SS		x					X		x
NK-TP-11N	1635144	06/09/97			SS		x					X		x
NK-TP-11S	1635145	06/09/97			SS		x					X		x
NK-TP-11W	1635147	06/09/97			SS		x					X		x
NK-TP-12E	1635150	06/09/97			SS		x					X		X
NK-TP-12E	1635151	06/09/97			SS		x					X		X
K-TP-12EN2	1641783	09/25/97	2.5		SS							x	x	
K-TP-12EN2	1641782	09/25/97	2.5		SS							x	x	
NK-TP-12ES2	1641785	09/25/97			SS							x	x	
K-TP-12ES2	1641784	09/25/97	2.5		SS							X	X	
NK-TP-12N	1635148	06/09/97			SS		x					X		X
NK-TP-12S	1635149	06/09/97			SS		x					X		x
NK-TP-12W	1635152	06/09/97			SS		x					X		x
NK-TP-13E	1635155	06/09/97			SS		x					X		x
NK-TP-13N	1635153	06/09/97			SS		x					X		x
NK-TP-13S	1635154	06/09/97			SS		x					X		x
NK-TP-13W	1635156	06/09/97			SS		x					X		x
NK-TP-13W	1635157	06/09/97			SS		x					X		x
NK-TP-14B	1635143	06/09/97			SS		x					X		x

Table TM10-1 *DRAFT*

SUMMARY OF TEST PIT SOIL SAMPLING AND ANALYSES

Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous
NK-TP-14E	1635141	06/09/97			SS		x					X		x
NK-TP-14N	1635139	06/09/97			SS		x					X		x
NK-TP-14S	1635140	06/09/97			SS		x					X		x
NK-TP-14W	1635142	06/09/97			SS		x					X		x
NK-TP-16E	1635177	06/10/97			SS		x					X		x
NK-TP-16N	1635175	06/10/97			SS		x					X		x
NK-TP-16S	1635176	06/10/97			SS		x					X		x
NK-TP-16W	1635178	06/10/97			SS		x					X		x
NK-TP-17E	1635165	06/10/97			SS		x					X		x
NK-TP-17N	1635163	06/10/97			SS		x					X		X
NK-TP-17S	1635164	06/10/97			SS		x					X		X
NK-TP-17W	1635166	06/10/97			SS		X					X		X
NK-TP-18B	1635170	06/10/97			SS		x					X		X
NK-TP-18N	1635167	06/10/97			SS		x					X		x
NK-TP-18S1	1635168	06/10/97			SS		x					X		x
NK-TP-18S2	1635169	06/10/97			SS		x					X		x
NK-TP-19E	1635112	06/09/97			SS		x	x				X		x
NK-TP-19N	1635110	06/09/97	2.80		SS		x	x				X		x
NK-TP-19W	1635113	06/09/97			SS		x	x				X		x
SK-TP-01E	1021173	11/05/96	9		SS							X		
SK-TP-01S	1021172	11/05/96	3		SS							X		
SK-TP-02E	1021178	11/05/96	15		SS							X		
SK-TP-02W	1021176	11/05/96	3		SS							X		
SK-TP-03	1021150	11/05/96	3		SS	x	x	x				X		x
SK-TP-04	1021151	11/05/96	2		SS	x	x					X		X
SK-TP-05	1021152	11/05/96	2		SS	x	x					X		X
SK-TP-07E	1635181	06/10/97			SS		x					X		x
SK-TP-07N	1635179	06/10/97			SS		x					X		x
SK-TP-07S	1635180	06/10/97			SS		x					X		x
SK-TP-07W	1635182	06/10/97			SS		x					X		x
SK-TP-07W	1635183	06/10/97			SS		x					X		x
SK-TP-08E	1635186	06/10/97			SS		x					X		x
SK-TP-08N	1635184	06/10/97			SS		x					X		x
SK-TP-08S	1635185	06/10/97			SS		x					X		x
SK-TP-08W	1635187	06/10/97			SS		x					X		x
SK-TP-09E	1635197	06/10/97			SS		x				x	X		X
SK-TP-09N1	1635193	06/10/97			SS		x				x	X		x
SK-TP-09N2	1635194	06/10/97			SS		x				x	X		x
SK-TP-09S1	1635195	06/10/97			SS		x				x	X		x
SK-TP-09S2	1635196	06/10/97			SS		X				x	X		X
SK-TP-09W	1635198	06/10/97			SS		x				x	X		x

Table TM1 *DRAFT*

SUMMARY OF TEST PIT SOIL SAMPLING AND ANALYSES

Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous
SK-TP-10E	1635203	06/10/97			SS		x				x	X		x
SK-TP-10N1	1635199	06/10/97			SS		x				x	X		x
SK-TP-10N2	1635200	06/10/97			SS		x				x	X		x
SK-TP-10S1	1635201	06/10/97			SS		x				x	X		x
SK-TP-10S2	1635202	06/10/97			SS		x				x	X		x
SK-TP-10W	1635204	06/10/97			SS		x				x	X		x
SK-TP-10W	1635205	06/10/97			SS		x				x	X		x

Notes: tection limit; x - Analysed, no analytes in group over the detection limit

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Table TM10-2 Area and Sampling Type Identifiers Airport/Klondike Areas, Pratt & Whitney, East Hartford, Connecticut			
Area Designation	**Area**	**Sampling Type Identifier**	**Explanation**
AB	Within A Building	MW	Monitoring Well
BB	Within B Building	PZ	Piezometer
CB	Within C Building	SW	Surface Water
DB	Within D Building	SD	Sediment
EB	Within E Building	CC	Concrete Chip
FB	Within F Building	SS	Surface Soil
GB	Within G Building	SB	Soil Boring
HB	Within H Building	TP	Test Pit
JB	Within J Building		
KB	Within K Building		
LB	Within L Building		
MB	Within M Building		
CS	Colt Street Facility		
EA	Engineering Area		
ET	Experimental Test Airport Laboratory		
LM	Area Outside Buildings L and M		
NA	North Airport Area		
NT	North Test Area		
NW	North Willgoos Area		
PH	Powerhouse Area		
SA	South Airport Area		
SK	South Klondike Area		
ST	South Test Area		
SW	South Willgoos Area		
WT	Waste Treatment Area		
XT	Experimental Test Area		

Table TM10-3
Test Pit Locations and Excavated Soil Volumes
Airport/Klondike Areas, Pratt & Whitney, East Hartford, Connecticut

Area	Test Pits	Date Excavated	Approximate Excavated Soil Volume (Cubic Yards)
North Airport Area			
Silver Lane Pickle Company Soil Piles	NA-TP-01	11/01/96	Not Recorded
	NA-TP-02	11/01/96	Not Recorded
	NA-TP-03	11/01/96	Not Recorded
North Klondike Area			
Undeveloped Land Soil Piles	NK-TP-01	8/19/96	52
Undeveloped Land Storage Area	NK-TP-02	8/19/96	67
	NK-TP-04	11/01/96	Not Recorded
	NK-TP-05	11/01/96	Not Recorded
	NK-TP-06	11/01/96	Not Recorded
Explosive Storage Area Fill Area	NK-TP-03	8/19/96	27
X-401 Dry Wells	NK-TP-07	4/11/97	49
	NK-TP-08	4/11/97	58
	NK-TP-09	4/11/97	1
	NK-TP-10	4/11/97	51
X-410 Maintenance and Storage Building Septic System	NK-TP-11	4/15/97	26
X-415 Septic System	NK-TP-12	4/15/97	27
X-415 Dry Well	NK-TP-13	4/15/97	7
X-401 Locker Room Septic System	NK-TP-14	4/11/97	63
X-430 Stainless Steel Tank	NK-TP-15	4/15/97	29
X-314 Septic System	NK-TP-16	4/15/97	44
X-415 AST	NK-TP-17	4/28/97	31
X-415 AST Pipe	NK-TP-18	4/28/97	18
Fire Training Area C	NK-TP-19	4/22/97	9
South Airport Area			
None			
South Klondike Area			
Firing Range	SK-TP-01	11/05/96	Not Recorded
	SK-TP-02	11/05/96	Not Recorded
X-307 Septic System	SK-TP-03	11/05/96	Not Recorded
	SK-TP-04	11/05/96	Not Recorded
	SK-TP-05	11/05/96	Not Recorded

Table TM10-3
Test Pit Locations and Excavated Soil Volumes
Airport/Klondike Areas, Pratt & Whitney, East Hartford, Connecticut

Area	Test Pits	Date Excavated	Approximate Excavated Soil Volume (Cubic Yards)
X-307 Septic System	SK-TP-07	4/15/97	89
Cryogenics Dry Well	SK-TP-06	4/18/97	13
and	SK-TP-09	4/18/97	68
Septic System	SK-TP-10	4/18/97	77
Linde Area UST	SK-TP-08	4/15/97	42

DRAFT

ATTACHMENT A

Test Pit Logs

TEST PIT LOG

Project Name:	Silver Lane Pickel Co.	Project Location:	East Hartford, CT	Test Pit No:	NA-TP-01

Project No: 68VC620

Test Pit Dimensions:
- **Length:** NM
- **Width:** NM
- **Depth:** NM

Groundwater Observations:
- **At:** NM **After:** **Hours**
- **At:** **After:** **Hours**

Contractor: LEA

Equipment Used: Case 580E

Inspector: F. Postma

Weather:

Date: 11/01/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Brown, fine SAND, some medium Sand, loose, moist, sapric Organic Matter
	1020906 1020907 1020908 1020910		0.0 0.1 0.1 0.4	As Above
4				As Above
	1020911		0.2	As Above
				Bottom of Test Pit at 6.2'
8				
12				
16				
20				
24				

Comments:
Grab Sample: 1020906 taken from North side at 2.2'; 1020907 taken from East side at 3.0'; 1020908 taken from South side at 2.5'; 1020909 taken from West side at 3.0'; 1021010 taken from Bottom at 6'.

Test Pit No: NA-TP-01

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TEST PIT LOG

Project Name:	Silver Lane Pickel Co.	Project Location:	East Hartford, CT	Test Pit No:	NA-TP-02

Project No: 68VC620

Test Pit Dimensions:
- Length: NM
- Width: NM
- Depth: NM

Groundwater Observations:
- At: NM After: Hours
- At: After: Hours

Contractor: LEA

Equipment Used: Case 580E

Inspector: F. Postma

Weather:

Date: 11/01/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Brown, fine SAND, little medium Sand, loose, moist, massive structure, metal
	1020911 1020912 1020913 1020914		0.0 0.2 0.3 0.2	As Above
4				As Above
	1021018		0.4	Dark brown, medium SAND, some fine Gravel, little coarse Sand, dense, moist
				Bottom of Test Pit at 6.0'
8				
12				
16				
20				
24				

Comments:
Grab Sample: 1020911 taken from North side at 2.3'; 1020912 taken from East side at 2.2'; 1020913 taken from South side at 3.0'; 1020914 taken from West side at 2.2'; 1021018 taken from Bottom at 6'.

Test Pit No: NA-TP-02

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TEST PIT LOG

Project Name: Silver Lane Pickel Co.
Project Location: East Hartford, CT
Test Pit No: NA-TP-03

Project No: 68VC620

Test Pit Dimensions:
Length: NM
Width: NM
Depth: NM

Groundwater Observations:
At: NM After: Hours
At: After: Hours

Contractor: LEA
Equipment Used: Case 580E
Inspector: F. Postma
Weather:
Date: 11/01/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Brown to reddish brown, fine SAND, some medium Sand, trace coarse Sand, loose, moist, brick, tile
				As Above
	1021019		0.1	As Above
	1021020		0.2	
4	1021021		0.2	Dark brown to black, fine SAND, little medium Sand, little Silt, dense, moist, brick, concrete, metal (sludge-like)
	1021022		0.2	
	1021024			
	1021023		3.3	As Above
				Bottom of Test Pit at 6.2'
8				
12				
16				
20				
24				

Comments:
Grab Sample: 1021019 & 1021024 taken from North side at 4.0'; 1021020 taken from East side at 4.0'; 1021021 taken from South side at 4.0'; 1021022 taken from West side at 3.3'; 1021023 taken from Bottom at 6.2'.

Test Pit No: NA-TP-03

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TEST PIT LOG

Project Name	Project Location	Test Pit No:
NK Undeveloped Land Soil Piles	Pratt & Whitney, East Hartford, CT	NK-TP-01

Project No: 68TR673

Test Pit Dimensions:

Length: 26
Width: 6
Depth: 9

Groundwater Observations:

At: NM **After:** **Hours**

Contractor: D. Legeyt

Equipment Used: Case 580 SuperE

Inspector: F. Postma

Weather: Sunny, 85F

Date: 8/19/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Pale yellow, fine SAND, trace(-) Silt, loose, moist to dry, massive structure
2				
4				
	1017463 1017464 1017465 1017466			Brownish yellow to dark brown, fine SAND, little medium Sand, trace Silt, moist, moderately dense, organic matter (sapric), stratified, grey, Silt inclusion on north side at 4', roots, mottles at 8.2'
6				As Above
8				
	1017422		0.3	As Above
10				Bottom of Test Pit at 9'
12				

Comments:
Grab Sample: 1017463 taken from south sideat 5.1'; 1017464 taken from west side at 5.
6'; 1017465 taken from east side at 5.1'; 1017466 taken from north side at ;
1017462 taken from bottom at 9'.

Printed On: 6/17/1998

Test Pit No: NK-TP-01

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TEST PIT LOG

Project Name
NK Undeveloped Land Soil Piles

Project Location
Pratt & Whitney, East Hartford, CT

Test Pit No:
NK-TP-02

Project No: 68TR673

Test Pit Dimensions:

Length: 31.1
Width: 6.3
Depth: 9.2

Groundwater Observations:

At: NM **After:** **Hours**

Contractor: D. Legeyt

Equipment Used: Case 580 SuperE

Inspector: F. Postma

Weather: Sunny, 85F

Date: 8/19/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Yellowish red, fine SAND, trace medium Sand, trace(-) Silt, loose, moist to dry, roots, metal piping
4				Strong brown, fine SAND, little Silt, moderately dense, moist, organic matter (sapric), strong petroleum odor, stratified (rudely), wood blocks, glass, roots, plastic
6	1017468		32	As Above
	1017469		720	
	1017470		120	
	1017471		60	As Above
8	1017467		18	Brown to dark brown, medium SAND, some coarse Gravel, dense, moist, angular
10				Bottom of Test Pit at 9.2'
12				

Comments:
Grab Sample: 1017468 taken from south side at 5.3'; 1027469 taken from north side at 5.2'; 1017470 taken from west side at 5.3'; 1017471 taken from east side at 5.5'; 1017467 taken from bottom at 9.2'.

Printed On: 6/17/1998

Test Pit No: NK-TP-02

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TEST PIT LOG

Project Name	Project Location	Test Pit No:
Explosives Storage Area	Pratt & Whitney, East Hartford, CT	NK-TP-03

Project No: 68TR673

Test Pit Dimensions:

Length: 26'
Width: 4'
Depth: 7.1'

Groundwater Observations:

At: NM **After:** **Hours**

Contractor: D. LeGeyt

Equipment Used: Case 580 SuperE

Inspector: F. Postma

Weather: Sunny, 85F

Date: 08/19/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0	1017473 1017474 1017475 1017476 1017477		220 220 320 76 220	Yellowish brown, fine SAND, little Silt, trace(+) medium Sand, moderately dense, moist, roots, cinder blocks
2	1017473 1017474 1017475 1017476 1017477		220 320 76 220	
4	1017472			
	1017472		88	Light grey, medium SAND, some fine Sand, loose, moist to very moist, mottles, water at 6', sapric and fibric organic matter
				Light grey, medium SAND, some fine Sand, loose, moist to very moist, mottles, water at 6', sapric & fibric organic matter
6				
				Bottom of Boring at 7'
8				
10				
12				

Comments:
1017473 Taken from North side at 4.3'. 1017474 Taken from North side at 4.4'.
1017475 Taken from South side at 4.4'. 1017476 Taken from West side at 5.1'.
1017477 Taken from East side at 4.0'. 1017472 Taken from Bottom at 7.2'
1017476 Taken from West side at 5.1'

Printed On: 6/17/1998

Test Pit No: NK-TP-03

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TEST PIT LOG

Project Name: NK Soil Piles Additional Investigation
Project Location: East Hartford, CT
Test Pit No: NK-TP-04

Project No: 68VC620

Contractor: LEA

Test Pit Dimensions:
Length: NM
Width: NM
Depth: NM

Equipment Used: Case 580E

Inspector: L. Bianchi

Weather:

Groundwater Observations:
At: NM After: Hours
At: After: Hours

Date: 11/01/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Reddish brown, fine SAND, some medium Sand, loose, moist
				Strong brown, fine SAND, little medium Sand trace Silt, loose, moist, strong petroleum odor
	1020891		6.0	As Above
	1020893		3.8	
	1020894		2.2	
4	1020892		2.4	As Above
				As Above
	1020895		30.0	Grey, medium SAND and fine SAND, loose, very moist, strong petroleum odor (free product?)
				Bottom of Test Pit at 6.0'
8				
12				
16				
20				
24				

Comments:
Grab Sample: 1020891 taken from North side at 3.0'; 1020892 taken from West side at 4.0'; 1020893 taken from South side at 3.0'; 1020894 taken from East side at 3.0'; 1020895 taken from bottom at 6.0'.

Test Pit No: NK-TP-04

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TEST PIT LOG

Project Name: NK Soil Piles Additional Investigation
Project Location: East Hartford, CT
Test Pit No: NK-TP-05

Project No: 68VC620

Test Pit Dimensions:
Length: NM
Width: NM
Depth: NM

Groundwater Observations:
At: NM After: Hours
At: After: Hours

Contractor: LEA
Equipment Used: Case 580E
Inspector: L. Bianchi
Weather:
Date: 11/01/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Yellowish brown, fine SAND, some medium Sand, loose, moist, rebar, tile
	1020896		0.2	Dark brown, fine SAND, little medium Sand, trace(+) Silt,
	1020897		42	moist, loose, sapric and fibric Organic Matter, petroleum
	1020898		0.2	
	1020899		0.4	odor, rebar
4				As above
	1020900		475	As above
				Bottom of Test Pit at 6.2'
8				
12				
16				
20				
24				

Comments:
Grab Sample: 1020896 taken from North side at 2.0'; 1020897 taken from East side at 3.0'; 1020898 taken from South side at 2.5'; 1020899 taken from West side at 2.6'; 1020900 taken from Bottom at 6.0'.

Test Pit No: NK-TP-05

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TEST PIT LOG

Project Name: NK Soil Piles Additional Investigation
Project Location: East Hartford, CT
Test Pit No: NK-TP-06

Project No: 68VC620

Contractor: LEA

Test Pit Dimensions:
- **Length:** NM
- **Width:** NM
- **Depth:** NM

Equipment Used: Case 580E

Inspector: L. Bianchi

Weather:

Groundwater Observations:
- **At:** NM **After:** **Hours**
- **At:** **After:** **Hours**

Date: 11/01/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Brownish yellow, fine SAND, some medium Sand, loose, slightly moist, asphalt, metal
	1020901		0.1	As Above
	1020902		0.3	
	1020903		0.3	
	1020904		0.3	As Above
4			0.1	
	1020905		0.4	As Above
				Bottom of Test Pit at 6'
8				
12				
16				
20				
24				

Comments:
Grab Sample: 1020901 taken from North side at 3.0'; 1020902 taken from East side at 2.0'; 1020903 taken from South side at 2.0'; 1020904 taken from West side at 2.2'; 1020905 taken from Bottom at 6.0'.

Test Pit No: NK-TP-06

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TEST PIT LOG

Project Name: Firing Range Area
Project Location: East Hartford, CT
Test Pit No: SK-TP-01

Project No: 68VC610

Contractor: LEA

Test Pit Dimensions:
Length: NM
Width: NM
Depth: NM

Equipment Used: Backhoe

Inspector: L. Bianchi

Weather:

Groundwater Observations:
At: NM **After:** **Hours**
At: **After:** **Hours**

Date: 11/5/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				6": Dark brown, fine SAND and SILT, moist, loose, root fragments; 18": Yellowish brown, fine SAND, some Silt, trace medium Sand, moist, loose, root fragments, mottling
	1021171 1021174			As Above
	1021170 1021172			As Above
4				As Above
				Dark brown, fine SAND, with Silt, trace medium Sand, wet, slightly dense, mottling
8	1021173			As above
				Bottom of boring at 9.0' *
12				
16				
20				
24				

Comments:
* Olive grey, CLAY, trace Silt, wet, stiff, at ≈ 9.0'. Test pit backfilled upon completion. Grab Sample: 1021170 taken from north side at 3.0'; 1021171 taken from west side at 1.0'; 1021172 taken from south side at 3.0'; 1021173 taken from east side at 9.0'; 1021174 taken from bottom at 2.0'.

Test Pit No: SK-TP-01

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TEST PIT LOG

Project Name: Firing Range Area	Project Location: East Hartford, CT	Test Pit No: SK-TP-02

Project No: 68VC610

Test Pit Dimensions:
- **Length:** NM
- **Width:** NM
- **Depth:** NM

Groundwater Observations:
- **At:** NM **After:** **Hours**
- **At:** **After:** **Hours**

Contractor: LEA

Equipment Used: Backhoe

Inspector: L. Bianchi

Weather:

Date: 11/5/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				6": Dark brown, fine SAND and SILT, moist, loose, root fragments; 18": Yellowish brown, fine SAND, with Silt, trace medium Sand, moist, loose, root fragments, mottling
				As Above
	1021176 1021179			As Above
4				As Above
				Dark brown black, fine SAND and SILT, some medium Sand, trace coarse Sand, wet, loose, mottling
8	1021175 1021177			As Above
				As Above
12				12": As above; 12": Olive grey, varved CLAY, trace Silt, wet, stiff
	1021178			As above
16				Bottom of Test Pit at 15'
20				
24				

Comments:
Test pit backfilled upon completion. Grab Sample: 1021175 taken from north side at 9.0'; 1021176 taken from west side at 3.0'; 1021177 taken from south side at 9.0'; 1021178 taken from east side at 15.0'; 1021179 taken from bottom at 4.0'.

Test Pit No: SK-TP-02

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TEST PIT LOG

Project Name: X-307 Area	Project Location: P&W, East Hartford, CT	Test Pit No: SK-TP-03

Project No: 68VC610

Test Pit Dimensions:
Length: NM
Width: NM
Depth: NM

Groundwater Observations:
At: NM After: Hours
At: After: Hours

Contractor: LEA

Equipment Used: Backhoe

Inspector: L. Bianchi

Weather:

Date: 11/05/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0			0.0	Dark brown, fine SAND and SILT, some medium Sand, little coarse sand, processed Stone, moist, loose
	1021150			As Above
4				Bottom of Test Pit at 3'
8				
12				
16				
20				
24				

Comments:
Grab Sample: 1021150 taken at 3.0.

Test Pit No: SK-TP-03

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TEST PIT LOG

Project Name: X-307 Area	Project Location: P&W, East Hartford, CT	Test Pit No: SK-TP-04

Project No: 68VC610

Test Pit Dimensions:
Length: NM
Width: NM
Depth: NM

Groundwater Observations:
At: NM **After:** **Hours**
At: **After:** **Hours**

Contractor: LEA

Equipment Used: Backhoe

Inspector: L. Bianchi

Weather:

Date: 11/05/96

Depth (Feet)	Sample Number	Strata Change	PID/FID (ppm)	Description of Materials
0				Strong brown, fine SAND, some Silt, little medium Sand, moist, loose
	1021151		0.0	As Above
				Bottom of Test Pit at 2'

4
8
12
16
20
24

Comments:
Grab Sample: 1021151 taken at 2'.

Test Pit No: SK-TP-04

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RDMS Document ID# 1146

Facility Name: PRATT & WHITNEY (MAIN STREET)

Phase Classification: R-9

Document Title: DRAFT, UNIT-SPECIFIC TECHNICAL MEMORANDA, SUMMARY SITE INVESTIGATION AND REMEDIATION REPORT, AIRPORT/KLONDIKE AREA, VOLUME 6 [PART 1 OF 5]

Date of Document: 01/01/01

Document Type: REPORT

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Comments:

TEST PIT LOCATIONS

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TABLES

Table 1

DRAFT

SUMMARY OF SAMPLING AND ANALYTICAL INFORMATION

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extraction	Miscellaneous
NK-SB-51	1016789	8/ 8/96	0	2	SB	x								
NK-SB-51	1016790	8/ 8/96	2	4	SB	x	x					X		
NK-SB-51	1016791	8/ 8/96	4	6	SB	x								
NK-SB-51	1016792	8/ 8/96	6	8	SB	x	x					X		
NK-SB-52	1016793	8/ 8/96	0	2	SB	x	x					X		
NK-SB-52	1016794	8/ 8/96	2	4	SB	x								
NK-SB-52	1016795	8/ 8/96	4	6	SB	x								
NK-SB-52	1016796	8/ 8/96	6	8	SB	x	x					X		
NK-SB-52	1016797	8/ 8/96	6	8	SB	x								
NK-TP-01B	1017462	8/19/96	9		SS	x	x					X		
NK-TP-01E	1017465	8/19/96	5.1		SS	x	x					X		
NK-TP-01N	1017466	8/19/96	5.2		SS	x								
NK-TP-01S	1017463	8/19/96	5.1		SS	x								
NK-TP-01W	1017464	8/19/96	5.6		SS	x								

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit; x - Analysed, no analytes in group over the detection limit

2. Printed on 10/07/98

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Table 2

DRAFT

SUMMARY OF SAMPLING AND ANALYTICAL INFORMATION (DETECTS) - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-SB-51	NK-SB-51	NK-SB-52	NK-SB-52	NK-TP-01B	NK-TP-01E	
	Sample ID	1016790	1016792	1016793	1016796	1017462	1017465	
	Sample Date	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/19/1996	08/19/1996	
	Sample Time	12:06	12:15	12:56	13:20	11:50	12:05	
	Sample Depth	2' - 4'	6' - 8'	0' - 2'	6' - 8'	9'	5.1'	
	Laboratory	AEL	AEL	AEL	AEL	AEL	AEL	
	Lab. Number	AEL96009077	AEL96009078	AEL96009079	AEL96009080	AEL96009370	AEL96009371	
Constituent	Units							
Date Metals Analysed	-	08/20/1996	08/20/1996	08/20/1996	08/20/1996	09/03/1996	09/03/1996	
Barium	mg/kg	11	7.99	10.7	7.62	12.5	19	
Chromium	mg/kg	7.89	5.68				8.88	
Copper	mg/kg			5.03	6.18			
Zinc	mg/kg	19.1	13.8	15.4	14.1	14.1	20.6	

Notes: 1. Only Detects Shown

2. Printed on 10/07/98

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Table 3

DRAFT

SUMMARY OF ANALYTICAL RESULTS - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-52
	Sample ID	1016789	1016790	1016790	1016791	1016792	1016792	1016793
	Sample Date	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996
	Sample Time	12:00	12:06	12:06	12:12	12:15	12:15	12:56
	Sample Depth	0' - 2'	2' - 4'	2' - 4'	4' - 6'	6' - 8'	6' - 8'	0' - 2'
	Laboratory	LEA	AEL	LEA	LEA	AEL	LEA	AEL
	Lab. Number	96-3895-013	AEL96009077	96-3896-014	96-3894-012	AEL96009078	96-3898-018	AEL96009079
Constituent	Units							
Date Metals Analysed	-		08/20/1996			08/20/1996		08/20/1996
Date Organics Analysed	-	08/14/1996	08/20/1996	08/14/1996	08/14/1996	08/22/1996	08/14/1996	08/22/1996
Arsenic	mg/kg		<1.11			<1.05		<1.01
Barium	mg/kg		11			7.99		10.7
Cadmium	mg/kg		<3.34			<3.15		<3.02
Chromium	mg/kg		7.89			5.68		<5.03
Copper	mg/kg		<5.56			<5.26		5.03
Lead	mg/kg		<22.2			<21		<20.1
Mercury	mg/kg		<0.222			<0.21		<0.201
Nickel	mg/kg		<11.1			<10.5		<10.1
Selenium	mg/kg		<1.11			<1.05		<1.01
Silver	mg/kg		<5.56			<5.26		<5.03
Zinc	mg/kg		19.1			13.8		15.4
Acetone	µg/kg		<30			<38		<32
Acrolein	µg/kg		<15			<18		<16
Acrylonitrile	µg/kg		<15			<18		<16
Benzene	µg/kg		<6.0			<7.2		<6.5
Benzene (screening)	µg/kg	<9 nc		<7	<6		<7	
Bromobenzene	µg/kg		<6.0			<7.2		<6.5
Bromoform	µg/kg		<6.0			<7.2		<6.5
Carbon Disulfide	µg/kg		<6.0			<7.2		<6.5
Carbon Tetrachloride	µg/kg		<6.0			<7.2		<6.5
Chlorobenzene	µg/kg		<6.0			<7.2		<6.5
Chlorodibromomethane	µg/kg		<6.0			<7.2		<6.5
Chloroethane	µg/kg		<6.0			<7.2		<6.5
Chloroethyl Vinyl Ether,2-	µg/kg		<6.0			<7.2		<6.5
Chloroform	µg/kg		<6.0			<7.2		<6.5
Chlorotoluene,o-	µg/kg		<6.0			<7.2		<6.5

Notes: 1. Printed on 10/07/98

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Table 3

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SUMMARY OF ANALYTICAL RESULTS - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-52
	Sample ID	1016789	1016790	1016790	1016791	1016792	1016792	1016793
	Sample Date	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996
	Sample Time	12:00	12:06	12:06	12:12	12:15	12:15	12:56
	Sample Depth	0' - 2'	2' - 4'	2' - 4'	4' - 6'	6' - 8'	6' - 8'	0' - 2'
	Laboratory	LEA	AEL	LEA	LEA	AEL	LEA	AEL
	Lab. Number	96-3895-013	AEL96009077	96-3896-014	96-3894-012	AEL96009078	96-3898-018	AEL96009079
Constituent	Units							
Chlorotoluene,p-	µg/kg		<6.0			<7.2		<6.5
Dibromomethane	µg/kg		<6.0			<7.2		<6.5
Dichlorobenzene,1,2-	µg/kg		<6.0			<7.2		<6.5
Dichlorobenzene,1,3-	µg/kg		<6.0			<7.2		<6.5
Dichlorobenzene,1,4-	µg/kg		<6.0			<7.2		<6.5
Dichlorobromomethane	µg/kg		<6.0			<7.2		<6.5
Dichlorodifluoromethane	µg/kg		<6.0			<7.2		<6.5
Dichloroethane,1,1-	µg/kg		<6.0			<7.2		<6.5
Dichloroethane,1,2-	µg/kg		<6.0			<7.2		<6.5
Dichloroethylene,1,1-	µg/kg		<6.0			<7.2		<6.5
Dichloroethylene,1,2-cis-	µg/kg		<6.0			<7.2		<6.5
Dichloroethylene,1,2-trans-	µg/kg		<6.0			<7.2		<6.5
Dichloropropane,1,2-	µg/kg		<6.0			<7.2		<6.5
Dichloropropylene,1,3-cis-	µg/kg		<6.0			<7.2		<6.5
Dichloropropylene,1,3-trans-	µg/kg		<6.0			<7.2		<6.5
Ethylbenzene	µg/kg		<6.0			<7.2		<6.5
Ethylbenzene (screening)	µg/kg	<20 nc		<15	<14		<16	
Hexanone,2-	µg/kg		<15			<18		<16
Methyl Bromide	µg/kg		<6.0			<7.2		<6.5
Methyl Chloride	µg/kg		<6.0			<7.2		<6.5
Methyl Ethyl Ketone	µg/kg		<15			<18		<16
Methyl-2-pentanone,4-	µg/kg		<15			<18		<16
Methyl-tert-butyl Ether	µg/kg		<6.0			<7.2		<6.5
Methylene Chloride	µg/kg		<18			<7.2		<6.5
Styrene	µg/kg		<6.0			<7.2		<6.5
Tetrachloroethane,1,1,1,2-	µg/kg		<6.0			<7.2		<6.5
Tetrachloroethane,1,1,2,2-	µg/kg		<6.0			<7.2		<6.5
Tetrachloroethylene	µg/kg		<6.0 N1			<7.2		<6.5

Notes: 1. Printed on 10/07/98

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Table 3

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SUMMARY OF ANALYTICAL RESULTS - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-51	NK-SB-52
	Sample ID	1016789	1016790	1016790	1016791	1016792	1016792	1016793
	Sample Date	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996
	Sample Time	12:00	12:06	12:06	12:12	12:15	12:15	12:56
	Sample Depth	0' - 2'	2' - 4'	2' - 4'	4' - 6'	6' - 8'	6' - 8'	0' - 2'
	Laboratory	LEA	AEL	LEA	LEA	AEL	LEA	AEL
	Lab. Number	96-3895-013	AEL96009077	96-3896-014	96-3894-012	AEL96009078	96-3898-018	AEL96009079
Constituent	Units							
Tetrachloroethylene (screening)	µg/kg	<25 nc		<19	<17		<20	
Toluene	µg/kg		<6.0			<7.2		<6.5
Toluene (screening)	µg/kg	<14 nc		<11	<10		<11	
Trichloroethane,1,1,1-	µg/kg		<6.0			<7.2		<6.5
Trichloroethane,1,1,1- (screening)	µg/kg	<250 nc		<188	<170		<195	
Trichloroethane,1,1,2-	µg/kg		<6.0			<7.2		<6.5
Trichloroethylene	µg/kg		<6.0			<7.2		<6.5
Trichloroethylene (screening)	µg/kg	<25 nc		<19	<17		<19	
Trichloromonofluoromethane	µg/kg		<6.0			<7.2		<6.5
Trichloropropane,1,2,3-	µg/kg		<6.0			<7.2		<6.5
Vinyl Acetate	µg/kg		<6.0			<7.2		<6.5
Vinyl Chloride	µg/kg		<6.0			<7.2		<6.5
Xylenes (Total)	µg/kg		<6.0			<7.2		<6.5

Notes: 1. Printed on 10/07/98

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Table 3
SUMMARY OF ANALYTICAL RESULTS - SOIL
P&W East Hartford: NK Undeveloped Land Area - Soil Piles

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	Location ID	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-TP-01B
	Sample ID	1016793	1016794	1016795	1016796	1016796	1016797	1017462
	Sample Date	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/19/1996
	Sample Time	12:56	13:10	13:16	13:20	13:20	13:33	11:50
	Sample Depth	0' - 2'	2' - 4'	4' - 6'	6' - 8'	6' - 8'	6' - 8'	9'
	Laboratory	LEA	LEA	LEA	AEL	LEA	LEA	AEL
	Lab. Number	96-3899-019	96-3900-020	96-3901-021	AEL96009080	96-3902-022	96-3903-023	AEL96009370
Constituent	Units							
Date Metals Analysed	-				08/20/1996			09/03/1996
Date Organics Analysed	-	08/14/1996	08/14/1996	08/14/1996	08/22/1996	08/14/1996	08/14/1996	08/29/1996
Arsenic	mg/kg				<1.03			<1.09
Barium	mg/kg				7.62			12.5
Cadmium	mg/kg				<3.09			<3.26
Chromium	mg/kg				<5.15			<5.43
Copper	mg/kg				6.18			
Lead	mg/kg				<20.6			<21.7
Mercury	mg/kg				<0.206			<0.217
Nickel	mg/kg				<10.3			<10.9
Selenium	mg/kg				<1.03			<1.09
Silver	mg/kg				<5.15			<5.43
Zinc	mg/kg				14.1			14.1
Acetone	µg/kg				<32			<30
Acrolein	µg/kg				<16			<15
Acrylonitrile	µg/kg				<16			<15
Benzene	µg/kg				<6.4			<6.0
Benzene (screening)	µg/kg	<6	<6	<8		<9 nc	<8	
Bromobenzene	µg/kg				<6.4			<6.0
Bromoform	µg/kg				<6.4			<6.0
Carbon Disulfide	µg/kg				<6.4			<6.0
Carbon Tetrachloride	µg/kg				<6.4			<6.0
Chlorobenzene	µg/kg				<6.4			<6.0
Chlorodibromomethane	µg/kg				<6.4			<6.0
Chloroethane	µg/kg				<6.4			<6.0
Chloroethyl Vinyl Ether,2-	µg/kg				<6.4			<6.0
Chloroform	µg/kg				<6.4			<6.0
Chlorotoluene,o-	µg/kg				<6.4			<6.0

Notes: 1. Printed on 10/07/98

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Table 3

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SUMMARY OF ANALYTICAL RESULTS - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-TP-01B
	Sample ID	1016793	1016794	1016795	1016796	1016796	1016797	1017462
	Sample Date	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/19/1996
	Sample Time	12:56	13:10	13:16	13:20	13:20	13:33	11:50
	Sample Depth	0' - 2'	2' - 4'	4' - 6'	6' - 8'	6' - 8'	6' - 8'	9'
	Laboratory	LEA	LEA	LEA	AEL	LEA	LEA	AEL
	Lab. Number	96-3899-019	96-3900-020	96-3901-021	AEL96009080	96-3902-022	96-3903-023	AEL96009370
Constituent	Units							
Chlorotoluene,p-	µg/kg				<6.4			<6.0
Dibromomethane	µg/kg				<6.4			<6.0
Dichlorobenzene,1,2-	µg/kg				<6.4			<6.0
Dichlorobenzene,1,3-	µg/kg				<6.4			<6.0
Dichlorobenzene,1,4-	µg/kg				<6.4			<6.0
Dichlorobromomethane	µg/kg				<6.4			<6.0
Dichlorodifluoromethane	µg/kg				<6.4			<6.0
Dichloroethane,1,1-	µg/kg				<6.4			<6.0
Dichloroethane,1,2-	µg/kg				<6.4			<6.0
Dichloroethylene,1,1-	µg/kg				<6.4			<6.0
Dichloroethylene,1,2-cis-	µg/kg				<6.4			<6.0
Dichloroethylene,1,2-trans-	µg/kg				<6.4			<6.0
Dichloropropane,1,2-	µg/kg				<6.4			<6.0
Dichloropropylene,1,3-cis-	µg/kg				<6.4			<6.0
Dichloropropylene,1,3-trans-	µg/kg				<6.4			<6.0
Ethylbenzene	µg/kg				<6.4			<6.0
Ethylbenzene (screening)	µg/kg	<13	<13	<16		<19 nc	<16	
Hexanone,2-	µg/kg				<16			<15
Methyl Bromide	µg/kg				<6.4			<6.0
Methyl Chloride	µg/kg				<6.4			<6.0
Methyl Ethyl Ketone	µg/kg				<16			<15
Methyl-2-pentanone,4-	µg/kg				<16			<15
Methyl-tert-butyl Ether	µg/kg				<6.4			<6.0
Methylene Chloride	µg/kg				<6.4			<6.0
Styrene	µg/kg				<6.4			<6.0
Tetrachloroethane,1,1,1,2-	µg/kg				<6.4			<6.0
Tetrachloroethane,1,1,2,2-	µg/kg				<6.4			<6.0
Tetrachloroethylene	µg/kg				<6.4			<6.0

Notes: 1. Printed on 10/07/98

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Table 3

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SUMMARY OF ANALYTICAL RESULTS - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-SB-52	NK-TP-01B
	Sample ID	1016793	1016794	1016795	1016796	1016796	1016797	1017462
	Sample Date	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/08/1996	08/19/1996
	Sample Time	12:56	13:10	13:16	13:20	13:20	13:33	11:50
	Sample Depth	0' - 2'	2' - 4'	4' - 6'	6' - 8'	6' - 8'	6' - 8'	9'
	Laboratory	LEA	LEA	LEA	AEL	LEA	LEA	AEL
	Lab. Number	96-3899-019	96-3900-020	96-3901-021	AEL96009080	96-3902-022	96-3903-023	AEL96009370
Constituent	Units							
Tetrachloroethylene (screening)	µg/kg	<17	<17	<20		<24 nc	<20	
Toluene	µg/kg				<6.4			<6.0
Toluene (screening)	µg/kg	<9	<9	<11		<13 nc	<11	
Trichloroethane,1,1,1-	µg/kg				<6.4			<6.0
Trichloroethane,1,1,1- (screening)	µg/kg	<165	<168	<203		<239 nc	<203	
Trichloroethane,1,1,2-	µg/kg				<6.4			<6.0
Trichloroethylene	µg/kg				<6.4			<6.0
Trichloroethylene (screening)	µg/kg	<16	<17	<20		<24 nc	<20	
Trichloromonofluoromethane	µg/kg				<6.4			<6.0
Trichloropropane,1,2,3-	µg/kg				<6.4			<6.0
Vinyl Acetate	µg/kg				<6.4			<6.0
Vinyl Chloride	µg/kg				<6.4			<6.0
Xylenes (Total)	µg/kg				<6.4			<6.0

Notes: 1. Printed on 10/07/98

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Table 3

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SUMMARY OF ANALYTICAL RESULTS - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-TP-01B	NK-TP-01E	NK-TP-01E	NK-TP-01N	NK-TP-01S	NK-TP-01W	
	Sample ID	1017462	1017465	1017465	1017466	1017463	1017464	
	Sample Date	08/19/1996	08/19/1996	08/19/1996	08/19/1996	08/19/1996	08/19/1996	
	Sample Time	11:50	12:05	12:05	12:10	11:55	12:00	
	Sample Depth	9'	5.1'	5.1'	5.2'	5.1'	5.6'	
	Laboratory	LEA	AEL	LEA	LEA	LEA	LEA	
	Lab. Number	96-4080-008	AEL96009371	96-4083-011	96-4084-012	96-4081-009	96-4082-010	
Constituent	Units							
Date Metals Analysed	-		09/03/1996					
Date Organics Analysed	-	08/21/1996	08/29/1996	08/21/1996	08/21/1996	08/21/1996	08/21/1996	
Arsenic	mg/kg		<1.27					
Barium	mg/kg		19					
Cadmium	mg/kg		<3.81					
Chromium	mg/kg		8.88					
Copper	mg/kg							
Lead	mg/kg		<25.4					
Mercury	mg/kg		<0.254					
Nickel	mg/kg		<12.7					
Selenium	mg/kg		<1.27					
Silver	mg/kg		<6.35					
Zinc	mg/kg		20.6					
Acetone	µg/kg		<39					
Acrolein	µg/kg		<20					
Acrylonitrile	µg/kg		<20					
Benzene	µg/kg		<7.8					
Benzene (screening)	µg/kg	<7		<6	<8	<7	<7	
Bromobenzene	µg/kg		<7.8					
Bromoform	µg/kg		<7.8					
Carbon Disulfide	µg/kg		<7.8					
Carbon Tetrachloride	µg/kg		<7.8					
Chlorobenzene	µg/kg		<7.8					
Chlorodibromomethane	µg/kg		<7.8					
Chloroethane	µg/kg		<7.8					
Chloroethyl Vinyl Ether,2-	µg/kg		<7.8					
Chloroform	µg/kg		<7.8					
Chlorotoluene,o-	µg/kg		<7.8					

Notes: 1. Printed on 10/07/98

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Table 3

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SUMMARY OF ANALYTICAL RESULTS - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-TP-01B	NK-TP-01E	NK-TP-01E	NK-TP-01N	NK-TP-01S	NK-TP-01W	
	Sample ID	1017462	1017465	1017465	1017466	1017463	1017464	
	Sample Date	08/19/1996	08/19/1996	08/19/1996	08/19/1996	08/19/1996	08/19/1996	
	Sample Time	11:50	12:05	12:05	12:10	11:55	12:00	
	Sample Depth	9'	5.1'	5.1'	5.2'	5.1'	5.6'	
	Laboratory	LEA	AEL	LEA	LEA	LEA	LEA	
	Lab. Number	96-4080-008	AEL96009371	96-4083-011	96-4084-012	96-4081-009	96-4082-010	
Constituent	Units							
Chlorotoluene,p-	µg/kg		<7.8					
Dibromomethane	µg/kg		<7.8					
Dichlorobenzene,1,2-	µg/kg		<7.8					
Dichlorobenzene,1,3-	µg/kg		<7.8					
Dichlorobenzene,1,4-	µg/kg		<7.8					
Dichlorobromomethane	µg/kg		<7.8					
Dichlorodifluoromethane	µg/kg		<7.8					
Dichloroethane,1,1-	µg/kg		<7.8					
Dichloroethane,1,2-	µg/kg		<7.8					
Dichloroethylene,1,1-	µg/kg		<7.8					
Dichloroethylene,1,2-cis-	µg/kg		<7.8					
Dichloroethylene,1,2-trans-	µg/kg		<7.8					
Dichloropropane,1,2-	µg/kg		<7.8					
Dichloropropylene,1,3-cis-	µg/kg		<7.8					
Dichloropropylene,1,3-trans-	µg/kg		<7.8					
Ethylbenzene	µg/kg		<7.8					
Ethylbenzene (screening)	µg/kg	<16		<13	<17	<14	<14	
Hexanone,2-	µg/kg		<20					
Methyl Bromide	µg/kg		<7.8					
Methyl Chloride	µg/kg		<7.8					
Methyl Ethyl Ketone	µg/kg		<20					
Methyl-2-pentanone,4-	µg/kg		<20					
Methyl-tert-butyl Ether	µg/kg		<7.8					
Methylene Chloride	µg/kg		<7.8					
Styrene	µg/kg		<7.8					
Tetrachloroethane,1,1,1,2-	µg/kg		<7.8					
Tetrachloroethane,1,1,2,2-	µg/kg		<7.8					
Tetrachloroethylene	µg/kg		<7.8					

Notes: 1. Printed on 10/07/98

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Table 3

DRAFT

SUMMARY OF ANALYTICAL RESULTS - SOIL

P&W East Hartford: NK Undeveloped Land Area - Soil Piles

	Location ID	NK-TP-01B	NK-TP-01E	NK-TP-01E	NK-TP-01N	NK-TP-01S	NK-TP-01W	
	Sample ID	1017462	1017465	1017465	1017466	1017463	1017464	
	Sample Date	08/19/1996	08/19/1996	08/19/1996	08/19/1996	08/19/1996	08/19/1996	
	Sample Time	11:50	12:05	12:05	12:10	11:55	12:00	
	Sample Depth	9'	5.1'	5.1'	5.2'	5.1'	5.6'	
	Laboratory	LEA	AEL	LEA	LEA	LEA	LEA	
	Lab. Number	96-4080-008	AEL96009371	96-4083-011	96-4084-012	96-4081-009	96-4082-010	
Constituent	Units							
Tetrachloroethylene (screening)	µg/kg	<20		<16	<22	<18	<18	
Toluene	µg/kg		<7.8					
Toluene (screening)	µg/kg	<11		<9	<12	<10	<10	
Trichloroethane,1,1,1-	µg/kg		<7.8					
Trichloroethane,1,1,1- (screening)	µg/kg	<199		<163	<215	<176	<179	
Trichloroethane,1,1,2-	µg/kg		<7.8					
Trichloroethylene	µg/kg		<7.8					
Trichloroethylene (screening)	µg/kg	<20		<16	<21	<17	<18	
Trichloromonofluoromethane	µg/kg		<7.8					
Trichloropropane,1,2,3-	µg/kg		<7.8					
Vinyl Acetate	µg/kg		<7.8					
Vinyl Chloride	µg/kg		<7.8					
Xylenes (Total)	µg/kg		<7.8					

Notes: 1. Printed on 10/07/98

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DRAWINGS

US EPA New England
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Image Target Sheet

RDMS Document ID# 1146

Facility Name: PRATT & WHITNEY (MAIN STREET)

Phase Classification: R-9

Document Title: DRAFT, UNIT-SPECIFIC TECHNICAL MEMORANDA, SUMMARY SITE INVESTIGATION AND REMEDIATION REPORT, AIRPORT/KLONDIKE AREA, VOLUME 6 [PART 1 OF 5]

Date of Document: 01/01/01

Document Type: REPORT

Purpose of Target Sheet:

[x] Oversized [ ] Privileged

[ ] Page(s) Missing [ ] Other (Please Provide Purpose Below)

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SOIL INVESTIGATIONS NORTH KLONDIKE UNDEVELOPED LAND SOIL PILE LOCATION & CONSTITUENTS DETECTED MAP

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DRAFT

UNIT-SPECIFIC TECHNICAL MEMORANDUM: X-430 STAINLESS STEEL TANK PRATT & WHITNEY, EAST HARTFORD, CT

AREA: North Klondike

SUB-AREA: X-430

ENVIRONMENTAL UNIT: X-430 Stainless Steel Tank

Location: In the North Klondike Area, this unit is located on the fifth road north from the North Access Road. The former stainless steel tank was located to the west of the X-430 Test Stand (Drawing 1).

Description: The former stainless steel tank was located on the west side of the former building which housed Test Cells X-430 through X-436 (Metcalf & Eddy, Inc., 1993). The tank was a partially exposed underground tank of unknown size. Presently, only the foundation of the former test stand building remains.

Dates of Operation: Approximately 1957 to 1993. The X-430 Test Stand was built in 1957 and remained in place until it was demolished in the early 1990's. The operation of the steel tank was presumed to parallel that of the X-430 Test Stand.

Processes: The former use of the tank is unknown. Specific information on the test operations for this area was not available. It is believed that at a minimum, this area was used as a general purpose test stand for testing any components requiring the available services and building construction.

Aerial Photographs: Large-scale aerial photographs for 1965, 1970, and 1975 were obtained from Keystone Aerial Surveys Inc. Two smaller-scale aerial photographs were obtained from the Pratt and Whitney (P&W) Photographic Services Department. All of the large-scale and smaller-scale aerial photographs reveal that the X-430 Test Stand was an existing structure in the North Klondike as early as 1965. However, no evidence that would indicate an underground tank was observable in any of the photographs.

Specific Contaminants of Concern: The specific contaminants are unknown. In order to be as comprehensive as possible in the investigation that was conducted, the following constituent groups were analyzed for: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals (arsenic, barium, beryllium, cadmium, chromium, lead, mercury, selenium, silver, nickel, and zinc), and total petroleum hydrocarbons (TPH).

Potential Release Mechanism: Impacts to soils and groundwater from potential spills or leaks associated with tank filling and tank leakage associated with the tank.

INVESTIGATION AND REMEDIATION ACTIVITIES:

Due to the potential for releases associated with the X-430 Area, various historical investigations have been conducted within this area generating analytical data in the general vicinity of the unit. Although not conducted specifically for the steel tank, these investigations have generated

incidental analytical data in the immediate vicinity of the steel tank. In order to be as comprehensive as possible, presentation of this data is included below in chronological order. Historical investigations for the X-430 Area were conducted in February 1990 and May 1993. Prior to 1990, no investigation of this unit had reported.

Furthermore, subsurface investigations to determine the degree and extent of potential soil contamination, specifically associated with the steel tank, were performed in January 1993, July 1996, October 1996, and May 1997. The steel tank was removed in April 1997 with subsequent soil removals conducted in October 1997, November 1997, and January 1998. The investigations and the remediation are discussed below in chronological order.

Three monitoring wells, NK-MW-03, NK-MW-16, and NK-MW-18, have been installed in the X-430 Area in the general vicinity of the steel tank. NK-MW-03 was installed by Westinghouse Environmental and Geotechnical Services, Inc. (Westinghouse) in February 1990. NK-MW-16 was installed by Metcalf and Eddy, Inc. (M&E) in May 1993. NK-MW-18 was installed by Loureiro Engineering Associates, P.C. (LEA) in July 1996. These monitoring wells were installed as part of investigations of groundwater contamination suspected to be from potential releases associated with the X-430 Test Stand. The sampling locations are shown on Drawing 2. During the installation of these monitoring wells, soil samples were collected for laboratory analysis and are discussed in the appropriate portions of the chronological presentation of the investigations.

Supplemental groundwater investigations have also been conducted in the vicinity of the steel tank since the installation of these monitoring wells. In order to be as comprehensive as possible, presentation of this incidental data is discussed as part of this Unit-Specific Technical Memorandum.

VOCs detected in groundwater from these monitoring wells have included 1,2-dichloroethylene (12DCE), cis-1,2-dichloroethylene (CDCE), trichloroethylene (TCE), tetrachloroethylene (PCE), ethyl benzene (EBZ), methylene chloride (MC), 1,1,1-trichloroethane (TCA), and xylenes (XYL) PCE was the only VOC with elevated concentrations and was only detected in some of the groundwater samples from monitoring well NK-MW-03. SVOCs, PCBs, and TPH were not detected in the groundwater samples that were analyzed from these monitoring wells. Additionally, three metals have been detected in groundwater samples collected from these monitoring wells. These metals include barium, chromium, and zinc. No elevated concentrations of metals have been noted.

In the summer of 1997, two piezometers, NK-PZ-01 and NK-PZ-02, were installed by LEA to measure the surface water and groundwater elevations in the stream immediately west of the X-430 Area. Subsequently, groundwater samples were collected from the piezometers on November 20, 1997. VOCs were not detected in either sample. However, TPH was detected in both samples. One or more of the metals analyzed were detected in each of the groundwater samples submitted for analysis. These metals include arsenic, barium, chromium, lead, nickel, silver, and zinc. A summary of the groundwater samples collected and analyses performed is included in Table 1. Concentrations of constituents detected in groundwater samples collected from these monitoring wells are presented in Table 4. A complete summary of groundwater sample analytical results with detection limits is presented in Table 5. Detected concentrations at

each groundwater sampling location are shown on Drawing 2. For a more detailed account of the groundwater sampling conducted in this area refer to *Technical Memorandum (TM) 3, Groundwater Sampling and Quality.*

February 1990 Investigation (Westinghouse):

Description: In February 1990, monitoring well NK-MW-03 was installed near the X-430 Test Stand by Westinghouse personnel. The well was screened below the water table with a screened interval of 7 to 12 feet. During the advancement of the boring for this well, a single soil sample was collected from a depth of 0 to 2 feet. The single soil sample was analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals. No additional analyses were performed on this soil sample. A summary of the samples collected and analyses performed is included in Table 1.

Investigation Results: Based on the boring log, groundwater was encountered at approximately 8 feet below the ground surface during the advancement of the boring. Varved clay was encountered at a depth of 12 feet. No visual or olfactory evidence of contamination was noted in the boring log.

Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1. For the single soil sample analyzed, there were no detectable TCLP metals noted.

Data Evaluation and Conclusions: The data were compared to the default numeric criteria included in the Connecticut Remediation Standard Regulation (RSR) and the site-wide background soil concentrations for various metals (Fuss & O'Neill, 1994). For a more detailed discussion of background concentrations of metals in soil refer to *TM 4, Background Soil Sampling and Analysis.* Criteria are established in the RSR based on exposure pathways for various environmental media, including soil and groundwater. The evaluation of the soils data is based on a comparison to the default numeric residential direct exposure criteria (RDEC), the industrial/commercial direct exposure criteria (IDEC), and the GB pollutant mobility criteria (GBPMC) included in the RSR. The evaluation of the groundwater data is based on a comparison to the residential volatilization criteria (RVC), the industrial/commercial volatilization criteria (IVC), and the surface water protection criteria (SWPC) included in the RSR.

No exceedances of the RSR were noted. Considering the data that was evaluated, little evidence exists that would indicate the presence of a release in the vicinity of this unit. Nevertheless, since only a single sample for leachable metals was available, additional investigations in the vicinity of the unit were warranted.

January 1993 Investigation (M&E):

Description: In January 1993, M&E installed eight Geoprobe® temporary polyvinyl chloride (PVC) well-points, NK-GP-12 through NK-GP-19, to sample the groundwater in the vicinity of the X-430 Area. All of these groundwater samples were analyzed for select VOCs by a mobile

laboratory. The sampling locations are shown on Drawing 2. A summary of the samples collected and analyses performed is included in Table 1.

Investigation Results: Concentrations of constituents detected in the groundwater samples are presented in Table 4. A complete summary of groundwater sample analytical results with detection limits is presented in Table 5. Detected concentrations at each groundwater sampling location are shown on Drawing 2. CDCE, PCE, and TCE were detected in the groundwater sample from NK-GP-18, while only PCE was detected in the groundwater sample from NK-GP-15. The highest concentrations of CDCE, PCE, and TCE detected were 5.0 micrograms per liter (µg/l), 72.0 µg/l, and 5.0 µg/l, respectively.

Data Evaluation and Conclusions: The data were compared to the default numeric criteria included in the RSR. For the VOCs detected in the groundwater, no exceedance of the RVC, IVC, or SWPC were noted.

Considering the data that was evaluated, evidence exists that would indicate a release in the vicinity of this unit. Since only groundwater samples were evaluated, additional investigations in the vicinity of the unit were warranted.

May 1993 Investigation (M&E):

Description: In May 1993, monitoring well NK-MW-16 was installed near the X-430 Test Stand by M&E personnel. The well was screened across the water table with a screened interval of 3.5 to 13.5 feet. During the advancement of the boring for this well, one soil sample was collected and analyzed by a fixed laboratory. The sample was a composite of the boring and was analyzed for metals, TPH, corrosively, and reactivity. The metals analyses included both mass and TCLP analyses. A summary of the samples collected and analyses performed is included in Table 1.

Investigation Results: Based on the boring log, groundwater was encountered at approximately 4 feet below the ground surface during the advancement of the boring. Varved clay was encountered at a depth of 12 feet. No visual or olfactory evidence of contamination was noted in the boring log.

Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1. One or more of the metals analyzed were detected in the soil sample submitted for analysis. Mass metals detected include arsenic, barium, beryllium, chromium, lead, nickel, and zinc. Barium was the only metal detected in the TCLP extraction. TPH was not detected in the soil sample from NK-MW-16.

Data Evaluation and Conclusions: The data were compared to the default numeric criteria included in the RSR and the site-wide background soil concentrations for various metals. The concentrations of the metals detected in the soil samples are typical of site-wide background concentrations. Metals were not detected above the RDEC, the IDEC, or the GBPMC.

Considering the data that was evaluated, evidence exists that would indicate the presence of a release in the vicinity of this unit. Since only a single soil sample was evaluated, additional investigations in the vicinity of the unit were warranted.

July 1996 Investigation (LEA):

Description: On July 9 through 12, 1996, seven soil borings, NK-SB-18 through NK-SB-24, and one monitoring well, NK-MW-18 were advanced in the general vicinity of the steel tank. The sampling locations are shown on Drawing 1. Soil samples were collected in continuous 2-foot intervals to 14 feet, with a 1-foot interval from 14 to 15 feet. The depth of 15 feet was selected to ensure that sufficient data was collected for comparison to the direct exposure criteria of the RSR. Soil samples were collected from monitoring well NK-MW-18 in the same manner as the soil borings, when the well was installed on July 11, 1996

A total of 67 soil samples were submitted to the LEA Analytical Laboratory and screened for the presence of target VOCs, including benzene (BZ), EBZ, PCE, toluene (TL), TCA, TCE, and XYL. Based on visual, olfactory, or instrument evidence, and with consideration of the potential release mechanism, two samples from each soil boring were submitted to Averill Environmental Laboratory, Inc. (AEL) and analyzed for the presence of VOCs, metals, and TPH.

In addition, groundwater samples were also collected from each of the borings, NK-SB-18 through NK-SB-24, using Geoprobe® screenpoint groundwater sampling techniques. The groundwater samples were collected from a depth of 5 to 7 feet below the ground surface, except for the samples from NK-SB-23 and NK-SB-24 which were collected from 9 to 11 feet. The groundwater samples were submitted to AEL and analyzed for the presence of VOCs, metals, and TPH. A summary of the samples collected and analyses performed is included in Table 1.

Investigation Results: Based on the boring logs, groundwater was encountered at approximately 2 feet to 4 feet and varved clay was encountered between 10 feet to 12 feet in all of the borings. In at least one boring, four inches of black sand and silt was noted at a depth of 2 feet just above a layer of processed stone at 2.5 to 4.5 feet. No other visual or olfactory evidence of contamination was noted on the boring logs.

Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1. Several VOCs were detected in the soil samples submitted to the LEA Analytical Laboratory and to AEL including PCE and TCE. VOCs were detected in the soil samples from NK-SB-21, NK-SB-22, and NK-SB-23. The highest VOC concentration detected in the soil samples was PCE at a concentration of 43 micrograms per kilograms (µg/kg) and 200 µg/kg in the analyses performed by LEA and AEL, respectively.

One or more of the metals analyzed were detected in each of the two soil samples submitted for analysis. These metals include arsenic, barium, cadmium, chromium, nickel, and zinc. TPH was only detected in one sample with a concentration of 4,140 milligrams per kilogram (mg/kg) in boring NK-SB-21 at a depth of 2 to 4 feet.

Concentrations of constituents detected in the groundwater sample are presented in Table 4. A complete summary of groundwater analytical results with detection limits is presented in Table 5. Detected concentrations at each groundwater sampling location are shown on Drawing 2. TPH was not detected in any of the groundwater samples. Barium, nickel and zinc were the only metals detected in the groundwater samples.

Several VOCs, including PCE, carbon disulfide (CDIS), and chloroform (CFM), were detected in the groundwater samples from borings NK-SB-19 and NK-SB-21 through NK-SB-24. The highest concentration of PCE detected was at a concentration of 94 micrograms per liter (µg/l), while the highest concentration of CDIS detected was at a concentration of 24J11 µg/l. The "J11" qualifier indicates that the value was estimated, because the concentration was above the calibration range. The highest concentration of CFM detected was at a concentration of 1.5 µg/l.

Data Evaluation and Conclusions: The data were compared against the default numeric criteria included in the RSR and the site-wide background soil concentrations for various metals. The concentrations of the metals detected in the soil samples are typical of site-wide background concentrations. Metals were not detected above the RDEC, the IDEC, or the GBPMC.

The only soil exceedances of the RSR occurred in soil boring NK-SB-21. TPH was detected above the RDEC, the IDEC, and the GBPMC in the soil sample collected from the 2 to 4 foot interval in soil boring NK-SB-21 as shown in Tables 6, 7, and 8, respectively. For the VOCs detected in soil, no exceedances of the RDEC, the IDEC, or the GBPMC were noted.

Several VOCs were detected in the groundwater samples collected for this unit. Two exceedances of the SWPC were also noted in the groundwater samples collected for this unit. Nickel was detected at a concentration that exceeded the SWPC in boring NK-SB-19 and PCE was detected at a concentration that exceeded the SWPC in boring NK-SB-24 as shown in Table 9.

Based on the presence of VOCs and TPH in the soil samples, and VOCs in the groundwater samples, there is evidence that a release of hazardous constituents has occurred in the vicinity of this unit. The degree and extent of the release has not been adequately characterized in this area.

October 1996 Investigation (LEA):

Description: During October 1996, seven soil borings, NK-SB-74 through NK-SB-80, were advanced in the general vicinity of the steel tank. The sampling locations are shown on Drawing 1. Borings NK-SB-74, NK-SB-79, and NK-SB-80 were advanced to a depth of twelve feet. The depth of twelve feet was selected to ensure that the varved clay was encountered. Borings NK-SB-75 through NK-SB-78 were advanced to a depth of six feet. The depth of six feet was selected to investigate a specific zone because of contamination previously encountered in the vicinity of these borings. Soil samples were collected from each of the borings in continuous two-foot intervals.

A total of 30 soil samples were submitted to the LEA Analytical Laboratory and screened for the presence of target VOCs. Based on visual, olfactory, or instrument evidence, and with consideration of the potential release mechanism, one or more samples from each boring were submitted to AEL and analyzed for the presence of VOCs, SVOCs, metals, and TPH.

In addition, groundwater samples were collected from borings NK-SB-74, NK-SB-79, and NK-SB-80, using Geoprobe® screenpoint groundwater sampling techniques. The groundwater samples were collected from a depth of 10 to 12 feet below the ground surface. The groundwater samples were submitted to AEL for analysis of VOCs, metals, and TPH. A summary of the samples collected and analyses performed is included in Table 1.

Investigation Results: Based on the boring logs, groundwater was encountered at approximately 4 feet in all of the borings. Varved clay was encountered in only one boring, NK-SB-80 at a depth of 10 feet. No visual or olfactory evidence of contamination was noted on the boring logs.

Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1. PCE was the only VOC detected in the soil samples submitted to the LEA Analytical Laboratory and was detected in the soil samples from borings NK-SB-74, NK-SB-77, NK-SB-79, and NK-SB-80. The highest PCE concentration detected in the soil samples analyzed was 34 µg/kg in boring NK-SB-77 at a depth of 0 to 2 feet.

CDCE and PCE were the only VOCs detected in the soil samples analyzed by AEL. CDCE was detected in one boring, NK-SB-77, at a depth of 2 to 4 feet at a concentration of 25 µg/kg. PCE was detected in three borings, including NK-SB-76, NK-SB-77, and NK-SB-80 with the highest concentration present in NK-SB-77 at a depth of 0 to 2 feet and a concentration of 25 µg/kg.

TPH was detected in the soil samples submitted to AEL from borings NK-SB-74, NK-SB-77, and NK-SB-78. The highest concentration of TPH detected was 64.8 mg/kg in boring NK-SB-77 at a depth of 2 to 4 feet. SVOCs were not detected in the single soil sample analyzed for SVOCs.

Concentrations of constituents detected in the groundwater samples are presented in Table 4. A complete summary of groundwater analytical results with detection limits is presented in Table 5. Detected concentrations at each groundwater sampling location are shown on Drawing 2. PCE was the only VOC detected in the groundwater samples analyzed for VOCs by AEL and was detected in two sampling locations, NK-SB-79 and NK-SB-80. The PCE concentration detected was 110 µg/l in boring NK-SB-80. VOCs were not detected in any of the other groundwater samples analyzed by AEL.

TPH was not detected in any of the groundwater samples. Two metals, barium and zinc, were detected in the groundwater samples from three sampling locations, NK-SB-74, NK-SB-79, and NK-SB-80. Barium was detected with the highest concentration of 0.059 milligrams per liter (mg/l) in NK-SB-80 and zinc was detected with the highest concentration of 0.041 mg/l in NK-SB-79.

Data Evaluation and Conclusions: The data were compared against the default numeric criteria included in the RSR and the site-wide background soil concentrations for various metals. The concentrations of the metals detected in the soil samples are typical of site-wide background concentrations. Metals were not detected above the RDEC or the IDEC.

For the VOCs detected in soil, no exceedances of the RDEC, IDEC, or the GBPMC were noted. For the VOCs detected in groundwater, the PCE detection from NK-SB-80 exceeded the SWPC.

TPH was not detected in any of the groundwater samples. However, TPH was detected in several of the soil samples. The concentrations of TPH detected in soil samples did not exceed the RDEC, the IDEC, or the GBPMC.

Based on the VOCs and the TPH detected in the soil samples and the VOCs detected in the groundwater samples, there is evidence that a release of hazardous constituents has occurred in the vicinity of this unit. The degree and extent of the release has not been adequately characterized. The most likely source of this contamination is the steel tank.

May 1997 Investigation (LEA):

Description: During May 1997, five soil borings, NK-SB-305 through NK-SB-308, were advanced in the general vicinity of the steel tank. The sampling locations are shown of Drawing 1. The borings were advanced to a depth of 12 feet. The depth of 12 feet was selected to ensure that the top of the varved clay was encountered. Soil samples were collected from each of the borings in continuous 2-foot intervals.

A total of 32 soil samples were submitted to the LEA Analytical Laboratory and screened for the presence of target VOCs. Based on visual, olfactory, or instrument evidence, and with consideration of the potential release mechanism, one or more samples from each of the borings were submitted to Quanterra Inc. (QNT) and analyzed for the presence of VOCs.

In addition, groundwater samples were collected from the borings, using Geoprobe® screenpoint groundwater sampling techniques. The groundwater samples were collected from a depth of 4 to 6 feet and 10 to 12 feet below the ground surface. The groundwater samples were also submitted to QNT for analysis of VOCs. A summary of the samples collected and analyses performed is included in Table 1.

Investigation Results: Based on the boring logs, groundwater was encountered at approximately 4 feet in all of the borings. Varved clay was encountered between 10 feet and 12 feet in the borings. No visual or olfactory evidence of contamination was noted on the boring logs.

Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1. PCE was the only VOC detected in the soil samples submitted to the LEA Analytical Laboratory. PCE was detected in soil samples from borings NK-SB-305, NK-SB-306, and NK-SB-308 with the highest concentration of 109 µg/kg in boring NK-SB-306 at a depth of 6 to 8 feet. The only VOC detected by QNT was acetone (ACT). ACT was detected in the soil samples from borings NK-SB-305, NK-SB-305, and NK-SB-306, with the highest concentration of 26J µg/kg in boring NK-SB-305 at a depth of 4 to 6 feet.

Concentrations of constituents detected in the groundwater samples are presented in Table 4. A complete summary of groundwater analytical results with detection limits is presented in Table 5. Detected concentrations at each groundwater sampling location are shown on Drawing 2. The

VOCs detected in the groundwater samples include acetonitrile (ACNL) from boring NK-SB-307; ACT from NK-SB-309; TCE from NK-SB-306, NK-SB-308, and NK-SB-309: and PCE from all of the borings.

Data Evaluation and Conclusions: The data were compared against the default numeric criteria included in the RSR. No exceedances of the default numeric criteria included in the RSR were noted for the VOCs detected in soil or groundwater. Since the ACT detected in the samples collected for this unit was not detected previously at this unit and it is a commonly detected laboratory contaminant, it is not believed to be present at this unit.

Based on the results of the laboratory analyses of soil samples collected, soil removal in the vicinity of boring NK-SB-21 at a depth of 2 to 4 feet is warranted for this unit. Soil with TPH concentrations above the RDEC was recommended for excavation to avoid the use of an environmental land use restriction (ELUR) in this area. The maximum depth of the excavation required to meet the RDEC was approximately four feet. Additionally, the stainless steel tank was recommended for removal as part of the Septic System Removal Project to eliminate this potential contaminant source.

April 1997 Soil Remediation (Environmental Remediation, Inc.)

Description: As part of the Septic System Removal Project conducted in the Airport/Klondike Area, the partially-exposed underground stainless steel tank was removed on April 10, 1997 by Environmental Remediation, Inc. (ERI). The soil excavated during these removal activities was disposed of off site as a non-hazardous waste. The excavation of the UST, identified as NK-TP-15, was approximately 13 feet by 13 feet by 4.2 feet deep. The location of the test pit is shown on Drawing 1.

Following the excavation of the test pit, confirmational soil samples, including duplicate soil samples, were collected from each of the four sidewalls of the test pit on April 15, 1997. Bottom samples were not collected if the particular excavation extended into the groundwater table. These soil samples were submitted to Environmental Science Services Laboratory (ESS) for analysis. Due to data validation issues, analytical results from ESS were deemed unusable for the Airport/Klondike Project. Subsequent to these concerns, ESS analytical results have not been considered within this Unit-Specific Technical Memorandum.

The confirmational sidewall samples and duplicate samples were recollected on June 10, 1997. These soil samples were submitted to QNT for analysis of VOCs, metals, and TPH. A summary of the samples collected and analyses performed are included in Table 1. The sampling locations are shown on Drawing 1.

Analytical Results: No visual or olfactory evidence of contamination was noted in the field paperwork. Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1.

One or more of the metals analyzed were detected in each of the soil samples submitted for analysis. These metals include arsenic, chromium, lead, mercury, nickel, and zinc. TPH was

only detected in the western sidewall sample NK-TP-15W of the excavation at a concentration of 15,000 mg/kg. The only VOC detected was PCE at concentration of 470 µg/kg in the western sidewall sample NK-TP-15W.

Data Evaluation and Conclusions: The data were compared against the default numeric criteria included in the RSR and the site-wide background soil concentrations for various metals. The concentrations of the metals detected in the confirmational samples are typical of background concentrations and are not indicative of a release from this unit. For the metals detected in soil, no exceedances of the RDEC or the IDEC were noted.

TPH was detected along the western wall, NK-TP-15W, at a concentration above the default numeric RDEC, IDEC, and the GBPMC as shown in Table 7, Table 8, and Table 9, respectively. Due to the TPH exceedance, the excavation of additional soils was recommended for the West wall of the excavation.

October 1997 Soil Remediation (Clean Harbors, Inc.)

Description: On October 27, 1997, additional soil was excavated from the West wall of test pit NK-TP-15 by Clean Harbors, Inc. (CHES). An additional 3 feet of soil in a westward direction was removed for disposal off the site. During this additional excavation, an apparent dry well was discovered and removed as part of the soil removal. The dry well consisted of 6-inch traprock for liquids infiltration. The location of the test pit is shown on Drawing 1.

On November 11, 1997, a confirmational soil sample, X-430W, was collected from the West wall of test pit NK-TP-15. The sample location is shown on Drawing 1 The sample was submitted to Accutest (ACC) and analyzed for the presence of VOCs and TPH. A summary of the samples collected and analyses performed are included in Table 1.

Analytical Results: Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1. TPH was detected in the western sidewall sample X-430W of the excavation at a concentration of 20,900 mg/kg. The only VOC detected was PCE at concentration of 86.5 µg/kg.

Data Evaluation and Conclusions: The data were compared against the default numeric criteria included in the RSR. TPH was detected along the western wall, X-430W, at a concentration above the default numeric RDEC, IDEC, and the GBPMC as shown in Table 7, Table 8, and Table 9, respectively. Due to the TPH exceedance, the excavation of additional soils was recommended for the West wall of the excavation.

November 1997 Soil Remediation (CHES)

Description: On November 26, 1997, additional soil was excavated from the West wall of test pit NK-TP-15 by CHES. An additional 5 feet of soil in a westward direction was removed for disposal off the site. The location of the test pit is shown on Drawing 1.

On December 1, 1997, two confirmational soil samples, X-430WN and X-430WS were collected from the West wall of test pit NK-TP-15. The sample locations are shown on Drawing 1. The

samples were submitted to ACC and analyzed for the presence of VOCs and TPH. A summary of the samples collected and analyses performed are included in Table 1.

Analytical Results: Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1. TPH was detected in the sidewall samples X-430WN and X-430WN of the excavation at concentrations of 7,310 mg/kg and 40.2 mg/kg, respectively. The only VOC detected was PCE at concentration of 29.2 µg/kg in sidewall sample X-430WN.

Data Evaluation and Conclusions: The data were compared against the default numeric criteria included in the RSR. TPH was detected along the western wall, X-430WN at a concentration above the default numeric RDEC, IDEC, and the GBPMC as shown in Table 7, Table 8, and Table 9, respectively. Due to the TPH exceedance in sample X-430WN, the excavation of additional soils was recommended for the West wall of the excavation.

January 1998 Soil Remediation (CHES)

Description: On January 12, 1998, additional soil was excavated from the West wall of test pit NK-TP-15 by CHES. An additional 5 feet of soil in a westward direction was removed for disposal off the site. The location of the test pit is shown on Drawing 1.

On January 13, 1998, three confirmational soil samples, X430WN2, X430WS2 and X430N2, were collected from the extended portion of the west wall and north wall adjacent to the building foundation. The sample locations are shown on Drawing 1. The samples were submitted to ACC and analyzed for the presence of VOCs and TPH. A summary of the samples collected and analyses performed are included in Table 1.

Analytical Results: Concentrations of constituents detected in soil samples collected for this unit are presented in Table 2. A complete summary of soil analytical results with detection limits is presented in Table 3. Detected concentrations at each soil sampling location are shown on Drawing 1.

TPH was detected in the sidewall samples X-430WN and X-430WN of the excavation at concentrations of 7,310 mg/kg and 40.2 mg/kg, respectively. The only VOC detected was PCE at concentration of 29.2 µg/kg.

TPH was detected in all three confirmational samples with the highest concentration of 112 mg/kg detected in sidewall sample X430N2. VOCs were not detected in sidewall sample X430WN2. But several VOCs were detected in the other two sidewall soil samples. Several VOCs were detected in sidewall sample X430WS2, including EBZ, TL, and XYL at concentrations of 2.9 µg/kg, 12.0 µg/kg, and 14.7 µg/kg, respectively. Several VOCs were detected in sidewall sample X430N2, including PCE and TL at concentrations of 2.4 µg/kg and 1.2 µg/kg, respectively.

Data Evaluation and Conclusions: The data were compared against the default numeric criteria included in the RSR. The concentrations of TPH and VOCs detected in X-430WN2, X-430WS2, and from X-430N2 were below the default numeric RDEC, IDEC, and the GBPMC.

Based on the results of the laboratory analyses of soil samples collected, the remediation of the soils surrounding the former stainless steel tank, the discovered dry well, and impacted soils in the vicinity of boring NK-SB-21, has eliminated the impacted soils and removed the suspected sources from this area.

In summary, TPH was detected in the soil sample from borings NK-SB-21 with an exceedance of the default numeric RDEC, IDEC, and GBPMC. During the removal of soils impacted by the releases and potential sources (i.e., the stainless steel tank), additional TPH-impacted soils were identified and removed. All of the soil exceedances identified have been remediated. Based on the results of the laboratory analyses of soil samples, this unit is believed to be adequately characterized and no further investigation or remediation is warranted for this unit.

The exceedance of the default numeric SWPC for PCE noted in the groundwater samples from NK-MW-03 (historically), NK-SB-24, and NK-SB-80 may be attributed to the steel tank or possibly the drywell that was excavated and removed as part of the remediation activities. With the soil removal, along with the removal of the steel tank and the dry well, the potential source of additional groundwater contamination has been removed. For a more detailed account of the groundwater sampling that included Geoprobe® screenpoint groundwater samples and monitoring well refer to *TM 3, Groundwater Sampling and Quality.*

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